been undertaken. In particular we should have liked to accumulate much more knowledge about the merits or otherwise of the system of tautening the panels of fabric between the longitudinals by means of wires and tapes. The fabric on the hull successfully withstood the dreaded ordeal of violent rising currents of air over the St. Lawrence, and only the fabric on the fins gave way under the strain. At the same time, this drawing in of the cover tended to permit water to make its way inside the hull. Obviously more experiments with the method were very desirable and should have proved valuable. As things are, no more experiments will be made. It seems a great pity that so many questions should have been left unanswered after so much thought and money had been expended on their preliminary investigation.

Talking of cost, many exaggerated statements have been published. The contract price paid for R 100 was £300,000. The managing director of the Airship Guarantee Co. Ltd. (Sir Dennistoun Burney, whom some papers persist in describing as the designer of the airship) stated that the ship cost a good deal more than that to build, but we have no means of knowing why the contract price was exceeded. The sum, certainly, seems far from excessive, when the size and the experimental nature of this airship are considered. In fact, she was a good bargain for the Government.

Sqd. Ldr. Booth has said that R 100 was the most stable airship in which he ever flew. Maj. G. H. Scott, when asked his chief impression of her Atlantic flights, replied "The ease of it all." These two encomiums from great authorities may well be taken as the epitaph of R 100.

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The Royal Aero Club

The Royal Aero Club held a house dinner on Wednesday, November 11, to celebrate its move from its comfortable, though shabby and rather cramped, quarters in Clifford Street to adequate, not to say splendid, accommodation at 119, Piccadilly. The new premises were recently occupied by the Cavendish Club, and 200 members of that club have stayed on as members of the Royal Aero Club. This addition to the list of members is very welcome, but, as the Chairman, Sir Philip Sassoon, informed the gathering in his speech after dinner, the new premises can accommodate more members still, and recruits would be very welcome. The transference of these 200 members from the Cavendish to the Royal Aero Club is a testimony to the affection entertained for the Piccadilly house by men who have for years past made it their "home from home." It speaks volumes for the amenities now provided, and should be an inducement to other gentlemen to apply for membership. To this may be added that practically all the old members of the Aero Club are highly delighted with their new quarters. We may take the case of one Elder Statesman of the Royal Aero Club, who seemed so wedded to the Clifford Street rooms that it would not have been surprising if he had resented a change of any sort. He privately expressed the highest appreciation of the change, although the time is past when he can make active use of the Squash Racquets Court, which Sir Philip Sassoon mentioned as one of the features which caused him most satisfaction.

This migration is a strange illustration of the whirligig of time. Lt. Col. Moore-Brabazon, the senior member of the committee, recalled that the new premises were once the home of the Royal Automobile Club, and that, in those days, the newly-formed Aero Club, which had not then become a Royal institution, made use of a small committee room in the building. The Aero Club was then a humble organisation, concerned almost entirely with the balloon. Few could have foreseen the heights to which it has now risen as the national institution for governing air sport. Still less could it have seemed probable that it would one day have those same premises, together with "the house next door," as its own home.

The growth in importance and consequence of the club is one measure of the growth of flying as a national interest and occupation. The club which represented the United Kingdom in the series of Schneider contests, and which now holds the Schneider Trophy in perpetuity, is an institution of interest to the whole world. Criticism of the club during the course of the contests has been heard in various quarters, mainly in foreign circles which objected to see the undoubted rights of Great Britain stoutly upheld. It has been said that he never made a friend who never made a foe; and criticism must always be expected by those who take a strong line in any discussion. Much of the criticism has not been impartial. In very difficult circumstances the Royal Aero Club has worthily upheld the interests of the country which it represents, and the tact of Col. Mervyn O'Gorman and others has smoothed out international difficulties without making unreasonable concessions. Even against a British Government the Royal Aero Club has had to fight for the interests of Great Britain in the air, and by its firm persistence, and its ability to enlist the potent help of friends such as Lady Houston, it has carried the day.

On the occasion of its house-warming the club very rightly remembered the able services of its secretary, Commander Perrin, and its house secretary, Mr. B. Stevenson. The latter, it was understood, was chiefly responsible for the details of the move to the new premises. The former has done very long and honourable service to the club in its management of air sport. His knowledge of rules and his quickness in making use of them (we have in mind a significant little incident at Venice) have been of the utmost service to the Committee. The modesty with which Com. Perrin replied to the toast of his health at the dinner in question gained him further laurels. Mr. Stevenson carried modesty too far; for he could not be found when calls arose for a speech from him.

The Royal Aero Club, in quarters suited to its dignity and importance, now enters on a new chapter in its career. We feel sure that all readers of FLIGHT will join with us in wishing it even greater prosperity in the future, and as speedily as may be as many new members as it is able to accommodate.

Two New Autogiros

The Cierva Autogiro Co., Ltd., has been working quietly for many years on the development of the Autogiro type of aircraft, and a vast amount of experimental work has been carried out in order to bring the combined rotor and fixed-wing system of lift up to an efficiency comparable with that achieved in orthodox aircraft. With such a novel system it was to be expected that development would take considerable time, but the company now feels that the Autogiro type of aircraft has reached a stage in its evolution when it can be put into the hands of the public with the confidence that the performance and general handling are such that the purchaser will get real service from his machine. Two new types, both incorporating mechanical starting of the rotor, are to be placed on the market at once. The new machines are described and illustrated below.

FOR the first time in its history the Autogiro invented by Senor de la Cierva is being put on the market in direct competition with existing orthodox types of aircraft. Hitherto the Cierva Autogiro Co. Ltd. has regarded its machines as experimental, but with the introduction of mechanical (engine-driven) rotor starters, three-bladed cantilever rotors, and folding rotor blades, the Cierva system of lift is considered to have put behind it the purely experimental stage and to have reached a point where it can compare reasonably with normal aircraft, both in performance and in general handling, more especially on the ground. Two new types of Autogiro were to be demonstrated at Hanworth yesterday, November 19, and form the subjects of the following notes. The two new types are the C.24, a cabin two-seater, and the C.19, Mark IV open two-seater. The former is equipped with the De Havilland "Gipsy III" inverted engine of 120 h.p., and the latter has an Armstrong Siddeley "Genet Major" of 100 h.p. The two machines have this in common that they are provided with the new three-bladed cantilever rotor, and that rotor-starting is accomplished not by deflecting the airscrew slipstream on to the rotor, as in earlier machines, but by means of a mechanical starter driven by the engine via a clutch mechanism. Very quick starting is achieved with this system, and the new Autogiros get away from standing start at least as quickly as a normal aircraft, while the length of run is very much shorter than that of any but the most powerful orthodox aeroplanes. Both types, it should be noted, are of a size and power to place them in the light plane class, suitable for the private owner. The production of larger machines will, it is to be expected, be the next step in the evolution of the Autogiro.

The Autogiro Type C.24

Much confusion has been caused in the mind of the general public by the fact that the C.24 was built by the De Havilland Aircraft Co. Ltd. The machine has been referred to as a sort of "Puss Moth" with a rotor in place of the normal wing, and with a small lower wing added. This is, as our photographs will clearly show, quite a misconception. There is, in point of fact, no similarity between the "Puss Moth" and the Autogiro

"FORMATING": The two new Autogiros are here seen taking off at Stag Lane aerodrome, the C.24 piloted by Senor de la Cierva and the C.19 Mark IV by Captain Rawson. (FLIGHT *Photo.*)

HIRTH AERO ENGINE

Type H.M. 60

Dimensions

Length, o.a.	775 mm. (30·5 in.).
Height	688 mm. (27·1 in.).
Width	386 mm. (15·2 in.).
Bore	110 mm. (4·33 in.).
Stroke	100 mm. (3·94 in.).
Capacity	3·45 litres (208 cu. in.).
Compression ratio	5·3 : 1

Weights

Dry, without hub, starter and exhaust stubs	82·3 kg. (181 lb.).
Specific weight (at normal power)	1·37 kg./h.p. (3·02 lb./h.p.).
Specific weight at maximum power	1·27 kg./h.p. (2·79 lb./h.p.).

Power

Normal power	60 b.h.p.
Normal speed	2,000 r.p.m.
Maximum power	65 b.h.p.
Maximum speed	2,100 r.p.m.

Consumption

Petrol consumption	0·225 kg./h.p./hr. (0·496 lb./h.p./hr.).
Oil consumption	0·01 kg./h.p./hr. (0·022 lb/h.p./hr.).

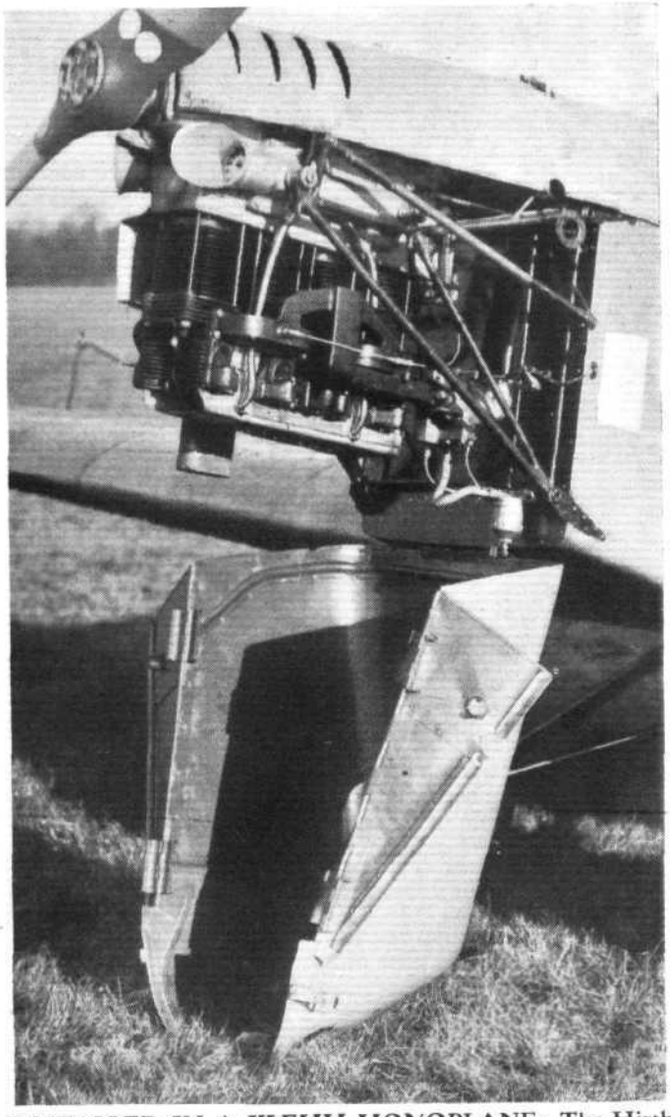
in the plane of the crankshaft and, as already mentioned, is cooled and ventilated by taking part of the intake air through it.

Cylinders.—The cylinders themselves are of cast iron, with light-metal heads, each cylinder head being separately detachable. Cylinders and cylinder heads are held to the crankcase by four long bolts, of which two are tubular, and act as casings for the push rods which operate the valves through valve rockers. There are two valves per cylinder. The pistons are Nelson-Bohnalite, and the connecting rods are chrome-nickel steel forgings.

Valve Operation.—The two valves per cylinder are, as already mentioned, operated by push rods and rockers. Driven by spur gears on the rear end of the engine are two camshafts situated between crank throws 1 and 2, and 3 and 4 respectively. The push rods are enclosed in the hollow cylinder bolts previously mentioned, and all joints in the valve-operating system are oiltight and protected against temperature changes so as to keep the valve clearance constant.

Lubrication System.—The Hirth inverted engine is, of course, of the dry sump type, with a scavenge pump to remove all superfluous oil. Two Bosch lubricators serve all lubrication points with the requisite amount of oil, and the valve rockers, etc., are lubricated via the hollow bolts which hold down the cylinders.

Induction System.—On the engine itself is an inlet manifold of more or less orthodox type. The carburetter is placed at the back of the engine, and the air intake is in the form of a fairly tall "chimney," through which is drawn partly fresh air from outside and partly warmed air from the crankcase. The latter air is drawn into the main air intake through two smaller branches which



INSTALLED IN A KLEMM MONOPLANE: The Hirth engine makes a very fine power plant for this machine, and is very smooth and quiet in running. Note the accessibility when the one-piece cowl is opened. (FLIGHT *Photo.*)

communicate with the upper part of the crankcase, and in the air intake "chimney" it mixes with the fresh air from outside before going through the carburetter.

Ignition System.—Coil ignition is used, the advantage of this system being, apart from the ease of starting which it provides, that an electricity output of no less than 20 Watt is available for the electric lighting of the machine. There are two sparking plugs per cylinder, and owing to the coil ignition the engine will idle at a speed as low as 150 r.p.m.

Starting.—It is claimed that, due chiefly to the extensive use of roller bearings and its consequent low friction, the engine is remarkably easy to start, and a hand starter is provided for this purpose, and, in conjunction with the coil ignition, makes for quite exceptionally easy starting.

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Civil (Service) Aviation

IT IS reported from East Africa that the Nyasaland Government has authorised officials to travel by air when on official duty provided the expense does not exceed the car allowance for a similar journey. The fact that air travel in Nyasaland works out at only 6d. per mile, against a standard car allowance of 10d., will probably induce many officials to avail themselves of the offer.

Viceregal Flying

A SIMILAR sign of the times to the above is to be found in a recent report from New Delhi, which stated that the Standing Finance Committee of the Assembly discussed the question of the purchase of an Avro Ten aeroplane for the Viceroy. This is intended as a measure of economy by restricting the use of special trains by enabling the Viceroy to make his visits by air. Lord and Lady Willingdon are said to support the suggestion. The proposal would mean a saving of money not only to the Central Government but also to Provincial authorities who often have to make arrangements for the Viceroy's reception.

Operating Companies in Ireland

THE two aircraft companies operating in Ireland, Iona National Airways, Ltd., and the Irish Aviation Co., had a successful season with joy-ride work, which is proving very popular at the seaside resorts. Unfortunately, however, the latter company appears to have gone out of business, and we understand that the Desoutter monoplane is to be returned to the company from whom it was originally chartered, and that Capt. E. G. Stewart, M.C., the pilot, has now joined Iona National Airways. This company has found business quite brisk recently, and has carried out a number of charter jobs for the Dublin newspapers, which are publishing numerous photographs of Irish towns taken from the air; it is expected that this company will shortly be adding to its fleet and enlarging its aerodrome.

THE ROYAL AERO CLUB OF THE UNITED KINGDOM

OFFICIAL NOTICES TO MEMBERS

THE Committee of the Royal Aero Club met on Wednesday, November 11, 1931, when there were present:—

The Rt. Hon. Sir Philip A. G. D. Sassoon in the Chair, Com. James Bird, Capt. H. Broad, Lt. Col. M. O. Darby, Maj. C. J. W. Darwin, W. Lindsay Everard, M.P., Capt. A. G. Lamplugh, Col. F. Lindsay Lloyd, John Lord, Lt. Col. J. T. C. Moore Brabazon, M.P., Lt. Col. M. O'Gorman, Maj. H. A. Petre, F. Handley Page and H. E. Perrin (Secretary), B. Stevenson (House Secretary).

Election of Members.—The following Members were elected:—

Hugh Herman Boulter, John Clifford Boulter, William Aaron Foster, John Theodore Murray-Aynsley, Sqd. Ldr. Alfred Gordon Bond, Ernest Arthur Garnett, John Percy Roland Oakes, Reginald Alfred Charles Brie, Wolfgang von Feilitysch, Karl Gerster, William Henry Murray, William James Riddell, Martin Rudolph, Alfred Fane Peers Fane, Francis Joseph Edwin Brake.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

10152	Walter R. Wilson ..	Maidstone Fl. School.
10153	Joseph P. Charlesworth	Yorkshire Ae. C.
10154	Evelyn R. Forestier-Walker	Norfolk & Norwich Ae. C.
10155	William L. Gordon ..	Hampshire Ae. C.
10156	Peter J. de Havilland ..	de Havilland Fl. School.
10157	Geoffrey W. Salt ..	Kuala Lampur Fl. C.
10158	Bruno P. H. de Roeper	Brooklands Fl. School.
10159	William R. T. Treplin ..	Nottingham Fl. C.(N.F.S.)
10160	Glyn Johnson	Reading Ae. C.
10161	Milo E. Hillacre-Richards	Blackpool & Fylde Ae.C.
10162	Earl of Halsbury ..	Surrey Fl. Services (N.F.S.)
10163	Stanley R. W. Lupton..	Herts & Essex Ae.C.
10164	William S. Aston ..	Do. do.
10165	Lancelot C. de Garston	Do. do.
10166	Lionel M. van Praag ..	Do. do.
10167	Alec J. Stimson ..	Do. do.
10168	John L. Macalpine ..	Blackpool & Fylde Ae. C. (N.F.S.)
10169	Paul W. Tebbutt ..	de Havilland Fl. School.
10170	Harry C. Saunders ..	Norfolk & Norwich Ae. C.
10171	Charles E. Lambe ..	Hampshire Ae. C.
10172	Edward D. Green ..	Do. do.
10173	Charles F. H. Grace ..	
10174	Charles E. F. Searle ..	Surrey Fl. Services.
10175	Harold C. Smith ..	Reading Ae. C.
10176	Govind P. Nair ..	Do. do.
10177	May C. Millington ..	Lancashire Ae. C.
10178	James E. Doran-Webb	High Post Aerodrome.
10179	Ernest F. Dackers ..	Liverpool Ae. C.
10180	John G. Parsons ..	Reading Ae. C.
10181	John A. Hankins ..	R.A.E. Ae. C.
10182	Arthur G. Fenn ..	Brooklands Fl. School.
10183	Guy W. Harben ..	Hanworth C. (N.F.S.)
10184	Herbert C. G. Watson ..	Kuala Lampur Fl. C.
10185	James N. Garnett ..	Bristol & Wessex Ae. C.
10186	Percy J. W. Cruttenden	Reading Ae. C.
10187	Ralph M. Milbanke ..	Airwork Fl. School.
10188	Gilbert B. Howarth ..	Newcastle Ae. C.
10189	Joseph Dean	Yorkshire Ae. C. (N.F.S.)
10190	Richard Humble ..	
10191	James Howlison ..	Lancashire Ae. C.
10192	Richard H. Penny ..	Hampshire Ae. C.
10193	George C. Macfarlane ..	Do. do.
10194	Frederic W. W. Wootton	Airwork Fl. School.
10195	August B. Randebrock..	Surrey Fl. Services.
10196	Douglas S. Wilson ..	Newcastle Ae. C.
10197	Austin L. Bryan ..	Hampshire Ae. C.
10198	Henri L. Cazes	Liverpool & Dist. Ae. C.
10199	Stanley R. G. Livesey ..	London Ae. C.
10200	Henry Vaughan ..	Brooklands Fl. School.
10201	Percy C. Farman ..	Midland Ae. C.
10202	John E. Horsman ..	Blackpool & Fylde Ae. C. (N.F.S.)
10203	Thomas Mosedale ..	Liverpool & Dist. Ae. C.
10204	Reginald T. Mills ..	Kuala Lampur Fl. C.
10205	William C. Johnson ..	Midland Ae. C.
10206	Arthur S. Owen ..	Cinque Ports Fl. C.
10207	Joseph W. Trevelyan ..	Rollason Aviation Co.
10208	Edith A. Turner ..	Liverpool & Dist. Aero C.
10209	Charles F. Almond ..	Air Service Training.
10210	George N. Beckmann ..	Do. do.
10211	Thomas I. Bishell ..	London Ae. C.
10212	Tom Miller	Yorkshire Ae. C.
10213	Erick A. Starling ..	Eastern Counties Ae. C.

Gliding Certificates.—The following Gliding Certificates were granted:—

A.199	Charles H. W. Jiggens..	North Kent Gl. C.
200	Edmund R. Ellingham	Do.
201	Alfred H. Walton ..	Royal Ae. S.
202	John A. Lawford ..	Southdown & S. Counties Soaring C.
203	Hubert C. Wynne ..	Ulster Gl. and Av. C.
204	Thomas Brown ..	Do. do.
205	Archibald C. T. Isaac ..	B.A.C. School of Auto-Towing.
206	George M. C. Wightman	Falkirk & Dist. Av. C.
207	Cecil J. Longmore ..	Furness Gl. C.
208	Vernon C. L. Foster ..	Do.
209	William Butterfield ..	Do.
210	Sidney Burnett ..	Do.
211	Joseph C. Redshaw ..	Do.
212	Cecil A. Britton ..	Do.
213	James Mitchell	Edinburgh Gl. C.
214	Charles H. A. Collyns ..	Do.
215	Major W. Cameron ..	Do.
216	Miss Y. Hackworth ..	Southdown Skysailing C.
217	Robert F. L. Gosling ..	Ilkley Gl. C.
218	Gilbert F. Keech ..	Edinburgh Gl. C.
219	Edward C. Anderson ..	S. Counties Soaring C.
220	Alexander J. Solomon	Dorset Gl. C.
221	Robert Inglis	Edinburgh Gl. C.
B.164	Cedric Alan Cornell ..	London Gl. C.
207	Cecil John Longmore ..	Furness Gl.
184	William R. Grant ..	London Gl. C.
124	Cecil Palmer	S. Counties Soaring C.
164	Arthur Leslie Haslam ..	Dorset Gl. C.

Schneider Contest, 1931.—It was decided to hold a Banquet on December 9, 1931, to commemorate the British victory in the Schneider Contest, 1931.

King's Cup Air Race, 1932.—The Members of the Racing Committee attended the Meeting and put forward their recommendations for the King's Cup Race, 1932. After a full discussion it was decided that the Race should be thrown open to all British subjects, that the minimum speed should be 110 m.p.h., and that pilots taking part must have flown solo at least 100 hr. prior to the closing date of entries.

Air Touring.—The Committee considered the report of the recent Conference which took place at Bucharest at the invitation of Prince Bibesco, the President of the F.A.I., and which was attended by the Air Ministers of England, France and Italy and a representative from Germany. The important questions under discussion were the regulations for passports for aerial touring, the unification of landing fees, carrying of wireless, carrying of sporting guns and the reduction of prohibited areas.

RACING COMMITTEE

The Racing Committee of the Royal Aero Club met on Wednesday, November 11, 1931, when there were present: Lt. Col. M. O. Darby, Maj. C. J. W. Darwin, Sqd. Ldr. H. M. Probyn, R. Ashley Hall, Flt. Lt. D. W. J. Bonham Carter, Col. F. Lindsay Lloyd, Maj. R. H. Mayo, Lt. Col. W. A. Bristow, Capt. W. Dancy and H. E. Perrin (Secretary).

King's Cup Race, 1932.—The Committee drew up its recommendations for the Race for the King's Cup, 1932.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1.

H. E. PERRIN, Secretary.

AN OPENING FOR BRITISH AIRCRAFT

(*Mr. J. W. McDonough's lecture on "The Operation of Aircraft in North-West Canada," concluded from page* 1139.)

THIS week we are able to publish the conclusion of Mr. McDonough's extremely informative lecture. Last week the author explained that although his company were willing to purchase English aircraft they were unable to find suitable ones for their purpose. This week he tells us just exactly what he desires in an aeroplane for the work which has to be done in that part of the world. He also admits that the Junkers Ju.52, which has been put in service by another company, is causing no little stir, since, if it does what is claimed for it, it should prove the right machine for the job, but he is sceptical as to the suitability of the wing arrangement for loading and unloading when the aircraft is on floats. The high-wing type he maintains allows ample space beneath the wing in which to get at the cabin in comfort, at the same time keeping the wing up out of harm's ways. We include photographs of the Junkers and also the Ford freighter, which may ultimately prove to be the type that operators there are looking for.

"Further efforts were made by several companies in 1930 to locate mineral deposits by the aid of aircraft. In July, 1930, rumours began to filter back that Dominion Explorers, Ltd., had made an important discovery. Little attention was paid to this until in the fall of the same year when engineers from Eldorado Mines, Ltd., working in the same area, confirmed all previous reports and arrived back with the news of a large deposit of Uraninite or radium-bearing ore on the Eastern shores of Great Bear Lake, twelve miles south of the Arctic Circle. The samples submitted to Government Laboratory test ran so high in radio-activity that all but the discoverers themselves were extremely sceptical as to the authenticity of the deposit. Government geologists were therefore sent in by aeroplane this summer to confirm the claims.

The company owning the radium claims had also done extensive development work and opened up a series of vein structures of the highest grade silver ore. Since that time little prospecting has been done owing to the freeze-up, but it is known that the deposits at Great Bear Lake are of the very greatest importance and value to the British Empire, and it is debatable which is of the greatest importance, the radio active ore or the silver. Besides these, other minerals of importance have also been found.

This discovery has been a great triumph for the aeroplane, for without its aid the Great Bear Lake mineral field might have laid dormant for hundreds of years. Nearly every mining company of importance in the Dominion of Canada is sending out men this coming spring to secure properties adjoining these new mineral deposits. Our own company is already engaged to carry in by air at least eighteen parties of prospectors and their equipment, as well as twenty tons of mining supplies for a large mining organisation. This very clearly is only the commencement, and we can look forward to an era of prosperity in the air-transportation business in the Dominion of Canada.

I hope I have given you some idea of the great possibilities that Canada has for the use of aircraft in its Northern territories, which have always been looked upon as an icy barren waste, unfit for man to live in.

The aircraft in service in Northern Canada are, I am sorry to say, almost without exception of foreign manufacture. Most are American types, but considerable favour is shown to the German all-metal Junkers aeroplane. Caused probably by the very aggressive sales campaign of that company.

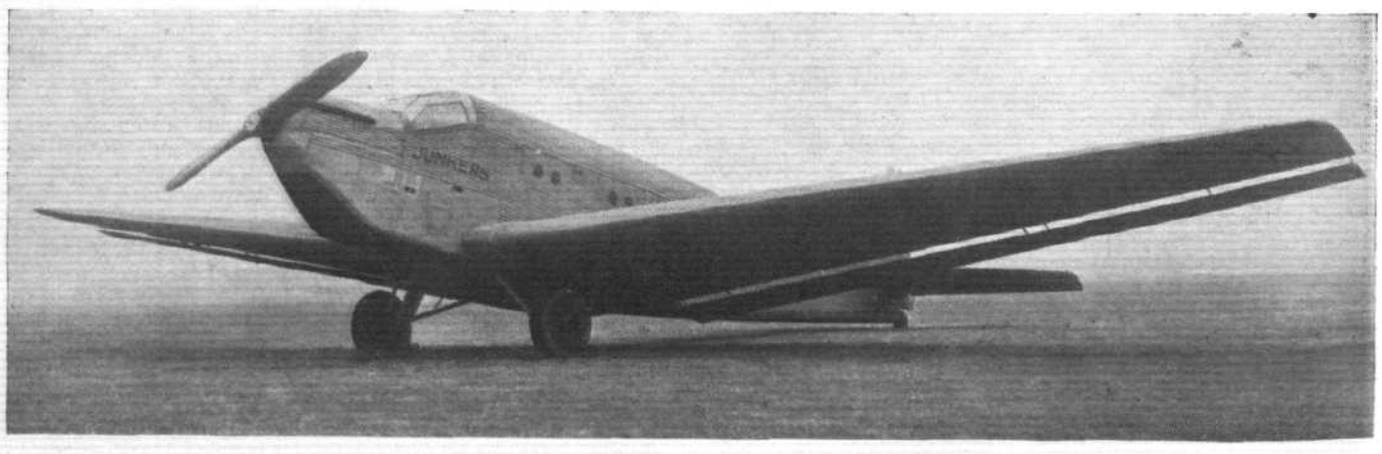
The chief value of the aeroplane as an aid to mineral exploration can be divided into eight distinct functions.

(1) The rapid and safe transportation of prospectors, food supplies and equipment.
(2) The extension of the prospecting season by reaching remote districts quickly.
(3) Visiting prospecting parties regularly, supplying their requirements, keeping them in touch with headquarters, and flying them out in case of business demands or illness.
(4) Flying supervisory engineers and geologists to districts from which important information has been received.
(5) Rapid inspection of claims, and confirmation or rejection of reports which might otherwise cause unwarranted effort.
(6) Flights by large freighting aircraft carrying complete mining staff for the investigation of distant areas with supplies and equipment for extensive examination of properties.
(7) Carrying directorial heads on tours of inspection.
(8) Co-operation with Government Departments in the rapid development of Northern Canada as regards its mineral resources.

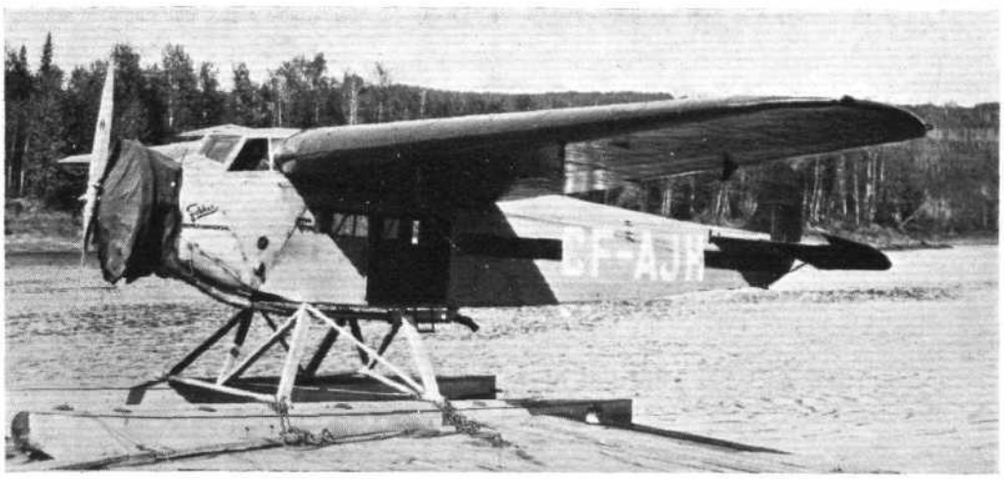
There are in Canada some 80 aircraft of the medium heavy class being used for remote operations by the Dominion Government as well as civil companies.

Perhaps you will allow me to say a few words anent the marketing of English aircraft in Canada, for, as an operator with much personal feeling in the matter, they may be constructive. The other day a business friend inquired the reason why our company operated a fleet of American-built aircraft, in preference to a British product, presupposing that Great Britain produced the finest available commercial aeroplane. The answer, gentlemen, did not require much consideration. It may be true that we produce in workmanship and materials a product unequalled in its particular field. This product is, though, an aeroplane chiefly designed to meet the requirements of a home market. Has England made any serious study relative to overseas markets other than the demands for purely military aircraft? particularly with reference to the Dominion of Canada. I can assure you that this is a very sore point with Canadian operators, as English manufacturers do not appear to have studied their requirements in any way.

Representatives from British aircraft companies appear to visit only the main Canadian cities in the East, where the flying is on air-mail routes, following main arterial communications, and at flying schools. The ideas of these



The all-metal Junkers Ju. 52 which with the B.M.W. VII, 700 h.p. engine has a payload of 4,680 lb. with a 622-mile range or 3,210 lb. when the range is increased to 1,244 miles. Mr. McDonough opines that the low-wing type will not be so easy to load as the high-wing type when on floats—an important point under N.W. Canadian conditions.



A Fokker Super-Universal of the S.M.A.T. Co. This type is not now used, as the ply-wood wing did not stand the climatic conditions well.

representatives as to the requirements of aircraft in Canada are thus confined to those particular types of operations, and which represent but the very smallest part of our air transportation activities.

An Invitation to the Aircraft Trade

If British aircraft companies wish to find out the extent of the possibilities for marketing their machines in Canada, I feel that the only satisfactory way is for them to send out representatives with technical knowledge to visit some of the more remote bases of the Northern Canadian operating companies. These representatives would then return to England with first-hand information, obtained from the observance of aircraft operating in the field under all conditions. As for our Company, we should welcome any such arrangement, and would provide representatives with every facility, living accommodation, and free air transportation from the railhead right up to the Arctic coast and back again.

One British company has been successful with the light aeroplane, but this is only a luxury trade. We are still in need of a British heavy-duty single-engine aircraft, suitable for our remote operations.

Canadian Airways, Ltd., a Canadian National and Canadian Pacific subsidiary, have purchased an all-metal Junkers Ju.52 freighter at a cost of approximately £15,000, and they operate at least 35 aircraft, all of American manufacture with the exception of two which are German. This situation in a British Dominion does little credit to the powers of salesmanship and progressive imagination of our own aircraft industry, but until a British aeroplane is produced to meet the requirements of Canadian service, the United States and Germany will continue to receive our unwilling patronage.

Canada is an Empire with thousands of square miles which the aeroplane alone can develop. The aeroplane most widely used for work in Northern Canada is the single-engine, high-lift or semi-high-lift, high-wing, convertible monoplane, adaptable to pontoons in summer and ski gear in winter. Multi-engined aircraft have been considered unsuitable for the country owing to the difficulty and time taken in preheating two or more engines in extreme temperatures.

The Fokker super-Universal and Fairchild cabin types hold about equal honours. Nearly all aeroplanes used on transportation service in Canada have Pratt & Whitney Wasp nine-cylinder radial engines. A few aircraft have the 220 Wright Whirlwind, which is moderately satisfactory, but in no way comparable to the Pratt & Whitney Wasp.

The Fokker and Fairchild have a top speed on floats of 90 m.p.h. and on skis of 100 m.p.h. Their cruising speed is about 80 m.p.h. on floats and 90 m.p.h. on skis. They have a landing speed of from 55 to 65, according to load, which in the latter figure is much too high and makes conditions extremely dangerous when landing on rough water or on hard-packed or drifted snow becomes necessary. The pay load, with two-thirds fuel, is 1,000 lb. on floats and 1,500 lb. on skis. The cruising range is 600 miles under normal conditions.

The Fokker is all-metal construction, fabric covered, with a three-ply wooden wing. The Fairchild is also all-metal, with wooden main wing spars and metal ribs, covered throughout with fabric. The Fokker wing is most unsatisfactory, owing to the effect of extreme temperatures on the three-ply. The Fairchild wing is excellent, as it folds. Propellers in use are the standard steel two-bladed type of variable pitch. Undercarriage shock absorption is of the Oleo type in the Fairchild and Aerol in the Fokker. The Fairchild Co. supplement their Oleo gear with shock-absorbing ski pedestals for winter use. The axle is allowed to travel on metal slides, is confined to the pedestal by two large phosphor-bronze bushes, and is regulated by shock cord. This arrangement is most satisfactory, even in extreme temperatures when the Oleo gear has ceased to work. Only the strongest and most efficient landing gears can survive the normal conditions of a Canadian winter.

What is Wanted

The advantages of the high-wing monoplane are great when operating on pontoons where there are obstacles above the level of the float gear. To approach a shore under unknown conditions the motor can be closed down, enabling the crew to use pole or paddle. Also folding wings are an added security where there is no means of tieing down in bad weather.

The monoplane requires a minimum of rigging maintenance, an important fact in such extremely cold temperatures.

The monoplane lends itself to repair and wrecked equipment can be salved and placed in flying condition more readily than a similar biplane.

Following, are a few observations on the faults existing in the aircraft now in use, and also suggestions as to the main desirable features to be looked for in suitable aircraft.

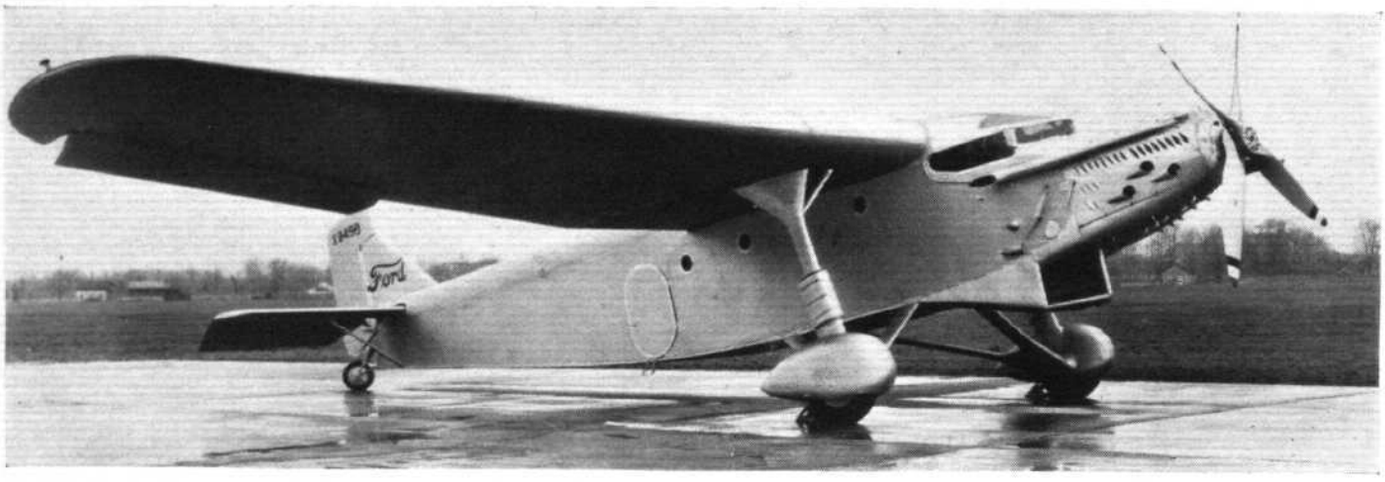
Reliability is of paramount importance for remote operations. A forced landing, especially in winter time, may be very serious. Therefore, the use of an untried engine cannot be contemplated. Engine installations must provide every facility for servicing routine. The present engine mount makes it very difficult to effect any adjustments to the rear of the engine. This may be all right in normal temperatures, but in sub-zero weather contact of the hand against metal results in frozen fingers. The installation must permit of all parts being easily and quickly attended to. One well-known radial engine which operated satisfactorily on the main Continental airways, was, in spite of every effort, quite unsatisfactory in sub-zero temperatures.

In the field engines must operate for 50 hr. at a stretch without any attention other than oil changes and external inspection of engine and cowlings. The C. type 450-h.p. Pratt & Whitney Wasp engine will run satisfactorily for 500 hr. without any attention other than an occasional set of new plugs, valve tappet adjustments and the removal of the oil screen and petrol filters.

Townend rings are not very satisfactory in winter owing to the difficulty of removal each time for pre-heating purposes. Satisfactory pre-heating is also delayed when a metal cowl lies between the engine and heater cover.

The chief room for improvement lies in the aeroplane. Let us consider our pay load per h.p. The Fairchild 71.A weighs 3,750 lb. gross, and is licensed for 8,500 lb. all up, leaving a useful load of 1,800 lb., which gives us a pay load after allowance for fuel and pilot of not more than 800 lb., or less than 2 lb. per h.p., presuming an engine of approx. 420 h.p. Machines are constantly overloaded to increase revenue, but this voids our insurance policies in case of accident.

Surely it is possible to produce a high-wing monoplane to carry a pay load of 4 lb. per h.p. under any normal conditions on floats or skiis, also being sufficiently rugged to stand rough use. Pay load per h.p. is very important, as fuel from certain caches costs as much as 18s. per gall. laid down.



The Ford all-metal freighter has a high wing providing easy access to the fuselage required by Mr. McDonough. With the 650 h.p. Hispano-Suiza the pay load is 3,500 lb. when the range is 500 miles.

Everything points to the all-metal covered monoplane as ultimately being most widely used in Northern Canada, as those engaged in remote areas seldom see the inside of a hangar. These conditions are not suitable for fabric- or wooden-covered wings or fuselages.

Cabin space in present freight aircraft is too restricted. A single-engine aircraft with a 400-h.p. motor should possess a cabin of 240 cub. ft., and ample lockers for stowing emergency equipment. The average cabin at present has only about 150 cub. ft. The pilot's cockpit must allow a maximum of comfort. Most freight pilots fly six to eight hours every day, and in the winter the cold is so intense that 10 deg. below zero inside the cabin is not unknown, as the cabin-heating arrangements at present are extremely poor.

For profitable operation the medium-heavy single-engine air freighter must have a pay load of at least 2,500 lb. on floats and 3,000 lb. on skis, and maintain a cruising speed of 100 m.p.h. for six hours without refuelling. It should take off glassy water with a pay load of 2,300 lb. and five hours' fuel supply in 40 sec., and have a landing speed under full load of not more than 53 m.p.h.

The Companies' Work

When a mining company wishes to send men or supplies to any area, this work is generally undertaken by the aircraft company on contract, on the lb./mile basis. It costs only 25 cents, or 1s., a pound to send goods 150 miles from the rail-head, but to ship them a further 700 miles northward will cost 10s. a pound. From this you will appreciate the necessity of operating an efficient service when mining companies have to pay such high rates.

Flying personnel are of the highest type, being first-class pilots well versed in the use of gun and axe, and therefore able to take care of themselves in any emergency. A senior pilot's salary with living allowance being on an average of £100 per month.

The insurance rates for pilots and machines are extremely low. I am not sure of the rates for other companies, but in our case we have complete cover for all risks except damage to equipment for operations right up to the 70th parallel of latitude. Our fleet policy covers the use of any three aeroplanes at one time for 12 per cent. per annum of the insured amount which, all things considered, seems most reasonable. In Canada operators are required by law to carry third-party coverage on all aircraft in use.

Before leaving the main base in winter or summer each aeroplane is inspected to see if the crew's emergency rations and the aeroplane field repair kit are on board. These consist of two guns with ammunition, food for two men for one month, two pairs of snow shoes in winter, a complete engine tool kit, and a very complete box of aeroplane parts sufficient to make any reasonable repair in the field, a spare cylinder and piston and various parts for the replacement of valve mechanism, spare oil, petrol funnel, 60 feet of 1½-in. rubber hose and an adequate petrol pump for use on barrels, which are the only source of fuel supply after the main base has been left. This fuel has to be transported to caches up to eight months in advance to ensure its being available. Should it not be there, the pilot and his mechanic may have a walk of a few hundred miles before obtaining assistance.

Flight operations are always very carefully planned, as sub-bases and refuelling caches are at least 250 to 300 miles apart. Aircraft are seldom out of gliding distance of suitable forced landing waters, both in winter and summer, owing to the numerous lakes and rivers. Whenever a forced landing does take place, the order of the day is to tie up the aeroplane, make camp, and await the arrival of the relief aircraft, which generally sets out as soon as an aeroplane is more than three days overdue. This length of time is always allowed as, owing to lack of communication, a machine may easily be held up by bad weather or forced to land owing to minor engine trouble which can be adjusted in a few hours.

These conditions are quite normal, and the personnel can well take care of themselves and generally arrive back at the base none the worse, although at times their aeroplanes show serious signs of wear, especially in the direction of the ski or float gear. Little can be said about summer operations, which follow normal practice. The chief discomfort experienced during summer in the Canadian bush is the plague of mosquitos and deer-flies.

The intense cold of winter provides many hardships for the mechanics, particularly the long pre-heating of engines in the morning before flight, producing a loss of time which is hard to make up, especially as the hours of daylight are so short. This cannot be overcome until a means of pre-heating is invented, possibly like the electrically-heated flying suit, which will in ten minutes, and without the risk of fire, do what takes a Coleman fire-pot and heat projector two hours to accomplish.

However, in spite of these difficulties, great progress is being made. One hundred and sixty thousand miles have been flown this year by Canadian companies, on mining operations, without one serious accident, over 200 tons of mining supplies have been transported to remote places by air, located from the rail-head to the Arctic coast, and the aeroplane has been the medium of opening up what may easily prove to be one of the world's biggest fields for future mineral development."

Arising out of the foregoing lecture, we have received the following interesting letter from Mr. Lee Murray writing from 175, Piccadilly, W.1:—

"The audience at Capt. McDonough's lecture in Film House on November 9 could not have failed to be impressed by his plea for a better understanding of the Canadian aircraft operator's needs. In his opinion, the British manufacturer has not produced a machine so well suited to Canadian conditions as the American-designed aircraft at present in use.

"These thoughts are not confined to Canadian aircraft operators, but are shared by operators in other Dominions. Australia has only been kept from becoming a market for American machines by the difficulties of obtaining renewals of Airworthiness Certificates, a high tariff on foreign aircraft, and the preference given to British machines in the

allotment of subsidies. I have often heard operators complain of these restrictions, and, since visiting America, I am convinced that the restricted entry of American machines into Australia is retarding very considerably the development of aviation there.

"In general, the medium-sized high-wing monoplane described by Capt. McDonough would have a market in Australia. In fact, in spite of some disadvantages in this type, it will eventually find a fairly general demand from Canada, South Africa, India, and Australia. It is therefore one of the few types that may be expected to justify mass production within the Empire.

"Having a large home market similar to our Dominions gives the American manufacturer an advantage which cannot be over-estimated. Many American firms have started factories in Canada, and sell their machines behind the protection of a 15 per cent. tariff on machines made in England. As soon as the buying power of other Dominions is restored, these Canadian factories will export American designed aircraft, and, unless there are competitive British types available, the Australian, New Zealand, and other Dominion operators will buy the Canadian American product.

"With commodity prices rising, and with the possibilities unfolded by Empire economic unity, it is more than probable that the Dominions' buying power will rapidly increase, and now is the time for the British manufacturer seriously to consider the production of a suitable type for their use. It is also necessary to consider and organise a suitable sales and spare parts service.

"Should British manufacturers take this matter seriously, it opens the way for free trade in the aviation industry within the Empire, and a high tariff wall against foreign aircraft. I am convinced that in its present rapidly developing condition aircraft construction should be concentrated in England, and only such assembly as is found economically advantageous should be carried out elsewhere. I am equally convinced that to force operators to use unsuitable machines is placing a burden on the whole industry, and if England does not produce a suitable type, then foreign aircraft of that type should be allowed into the Empire without great restriction.

"I felt very keenly on Monday night that Capt. McDonough paved the way for a profitable discussion had time been unlimited, and, if through your paper you would encourage Dominion operators to describe the conditions under which their aircraft operate, much good might be done.

"Without frank criticism and mutual readjustment the ideal of Empire economic unity will never be realised in the aircraft industry."

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PRIVATE FLYING AND CLUB NEWS

LONDON AEROPLANE CLUB.—Friends and members of the London Aeroplane Club, who have not booked their table at the Annual Dinner-Dance at the Park Lane Hotel on December 4, are reminded that the numbers are limited to 300. To avoid disappointment, phone the Dance Secretary, Mr. M. P. S. Spencer, at Edgware 0142 and reserve your seats by return.

CINQUE PORTS FLYING CLUB.—Flying time for the week ending November 8 reached the total of 16 hr. 40 min., in spite of not too good weather and short daylight hours.

Lympne appears to be developing into the recognised point of departure for long-distance flight. Mr. Mollison, who hoped to break the record recently set up by Mr. Store and Miss Salaman, had been waiting for favourable weather for some days, and found the Club's headquarters a welcome oasis in an area of depression and gale warnings.

We are glad to welcome to the Club four new members, Mr. C. J. Berry, a private owner, Mr. E. H. Paul, Mr. S. B. Russell and Mr. C. M. C. Turner, all of whom have commenced instruction. Mr. Turner is well known in "gliding" circles, and has just recently purchased an "Aeronica" monoplane.

Lt. Com. Harries obtained his "A" Licence in good style.

HANWORTH CLUB.—A film, "The City of Tomorrow," together with the "Autogiro" film, will be shown at the Club at 6 p.m. on Saturday, November 21. The former is the Town Planning film recently exhibited by the London Society at the Royal Society of Arts, and consists of two parts: Part 1.—The Haphazard Destruction of the Country side. Part 2.—The Well-planned City of the Future.

The "Autogiro" film, kindly lent by the Cierva Autogiro Co., Ltd., whose headquarters are now at Hanworth, was taken by an associated firm in the United States of America, and shows the lines upon which the "Autogiro" machine has been developed in that country.

Clay-Pigeon Shooting.—Arrangements have been made for permanent facilities for Clay-Pigeon Shooting for members and their guests on Saturdays. This arrangement has been made possible by the generous offer of traps from Lt. Com. G. Rodd, R.N., and Mr. W. A. Greenfield. Sweepstake competitions will be arranged. Prior application for use should, where possible, be made to Hon. Sec. of the Club Committee, in order that arrangements may be made for personnel. Members should bring their own guns, but cartridges will be supplied at 3s. 8d. per box of 25, and birds at 1s. for 10.

Badminton.—Members are advised that Badminton is now available, a court having been prepared in one of the hangars.

THE LANCASHIRE AERO CLUB.—The official opening of the new Clubhouse of the Lancashire Aero Club is to take place at Woodford on Saturday, November 28.

The opening ceremony will be performed by the Director of Civil Aviation at 1.30 p.m. sharp, and will be followed by a Luncheon in the Clubhouse.

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R.Ae.S. Public Schools Lectures

THE Royal Aeronautical Society have recently inaugurated a series of lectures before the Public Schools. These lectures were begun as an experiment, but the great interest that has been shown has caused the Council seriously to consider making such lectures permanent. Lectures during the next few months are being arranged for before over a hundred of the Public Schools in Great Britain. The Society has prepared a series of slides with full notes attached, so that a prospective lecturer has very little indeed to do. The slides have been specially prepared to stimulate the interest of public school boys and others, and to show the development of British aviation from 1908 to 1931. Most of the lectures for the next few months have been arranged, but the Council would welcome any offers from members of the Society to deliver the lecture before their old school, provided arrangements have not already been made, and the slides are available. Lectures have been delivered to or arranged for such schools as Eton, Westminster, Stowe, Bedford, Tonbridge, Sherborne, etc., and those delivered have confirmed the belief that in the schools there is a vast amount of interest in aviation which deserves all encouragement. This interest can hardly be better encouraged than by means of lectures of this type. The Council are willing to consider applications from schools for illustrated aeronautical lectures, and will endeavour to make the necessary arrangements, if the slides are available.

"Clouds"

SIR GILBERT WALKER will lecture before the British Gliding Association on "Clouds," on Monday, November 23, at 5.30 p.m., in Room 15 at the City and Guilds (Eng.) College, Exhibition Road, South Kensington. Air Com. J. A. Chamier will be the Chairman. The lecture is the first of a series organised by the Imperial College of Science, the British Gliding Association, and the London Gliding Club. Details of other forthcoming lectures will be announced shortly.

AIR TRANSPORT

COMMERCIAL FLYING IN FINLAND AND ROUMANIA

IN the reports issued by the Department of Overseas Trade on the Economic Conditions in Finland and Roumania, the following references are made to air transport:—

Finland.—The Finnish Aero Company of Helsingfors maintains passenger and goods services on the Helsingfors-Stockholm and Helsingfors-Tallinn routes, on the former route during the summer months and on the latter in the winter as well, as soon as the ice is strong enough for landing.

The Swedish Aerotransport Company also co-operates in the Helsingfors-Stockholm line. The Aero Company receives a Government subsidy. During the present year the Aero Company is also running the Stockholm-Gothenburg section of the night mail service between Stockholm and Copenhagen. The Abo-Mariehamn-Stockholm service, which was run in recent years, has been discontinued in the present year, but the Helsingfors-Stockholm planes make a call at Åbo. The following table shows the progress of the Aero Company:—

	Kilometres Flown.	Passengers.	Mail.	Freight.
			Kg.	Kg.
1924 ..	18,330	534	508	4,094
1925 ..	51,640	1,453	533	7,990
1926 ..	93,059	2,276	9,637	22,252
1927 ..	169,043	5,214	5,426	21,416
1928 ..	263,925	8,157	10,063	38,923
1929 ..	284,110	9,114	16,723	68,597
1930 ..	248,720	3,890	21,582	40,664

The reduction in passengers in 1930 is principally due to ice conditions on the Tallinn route, and the small reduction in the total distance flown is due to an increase in the night mail services between Stockholm and Copenhagen, in which the company has been co-operating since 1928.

Several types of aeroplanes are constructed in Finland, some under licence. Apart from the military flying school there is also a civil flying school, and the Volunteer Defence Force has recently started a flying corps. The Air Defence Association carries on a lively propaganda in favour of aviation.

Roumania.—The only civil aerodromes at present in use in Roumania are those of Baneasa (near Bucarest), Galatz and Cernauți. A civil aerodrome is under construction at Cluj, and the military aerodrome at Chișinau is available for use by the Civil Aviation Service, and it is hoped that ultimately a part of this aerodrome will be definitely set aside for the use of the Civil Flying Service.

There is as yet no customs station for seaplanes, but the military seaplane station at Siut-Ghiol may be used by civil and foreign seaplanes with a permit from the military authorities.

The use of military air stations by civil aircraft is only permitted on the basis of a permit from the Ministry of the Army (Direcția Aeronautica).

The following air routes over Roumania are permitted to foreign aircraft:—

(1) Constanza-Bucarest.
(2) Cernauți-Bucarest.
(3) Satu Mare-Cluj-Brașov-Bucarest.
(4) Oradea-Mare-Cluj-Brașov-Bucarest.
(5) Arad-Timișoara-Caransebeș-Orșova-Turnu-Severin-Bucarest.
(6) Giurgiu-Bucarest.

A translation of the decision of the Ministry of Industry and Commerce of October 10, 1930, relative to the charges made for the use of civil aerodromes of the State, which are open to public traffic, may be consulted at the Department of Overseas Trade (35, Old Queen Street, S.W.1).

The only civil air services in Roumania are the following:—CIDNA, a company which runs a daily service from Paris to Bucarest and *vice versa* from about April to November. The calling stations on this route are Strassburg, Nürnberg, Prague, Vienna, Budapest and Belgrade; and LOT, a company which, since the spring of 1930 has run a service three times a week from Dantzig, through Warsaw to Bucarest, with short stops at Lemberg, Cernauți (or Jassy) and Galatz. At present these aeroplanes call at Jassy, as the customs premises on the Cernauți aerodrome are in course of construction. This line will shortly be extended to Sofia (Bulgaria).

About the end of the year 1930 the Civil Aviation Department put forward a suggestion for the formation of a limited liability company with the co-operation of foreign capital and of the Roumanian State to undertake the management of all civil air transport and eventually to establish or participate in other enterprises connected with air transport. Up to the end of April, 1931, there had been no response from abroad to this suggestion. The fact is that the Civil Aviation Department has run no air lines up to the present, and it was no doubt hoped that the companies already working in this country would join with the Department and perhaps with other foreign enterprises to form a large company with State participation.

The only civil aerodromes which have customs accommodation are those of Baneasa (near Bucarest) and Galatz, but as above stated the aerodrome of Cernauți will shortly be added to their number.

A Fast Trip from Marseilles to Paris

ONE of the Air Union machines, carrying six passengers, accomplished a remarkably fast trip between Marseilles and Paris recently. It covered the 470 miles in 2 hr. 55 min., including a stop of ten min. at Lyons, representing an average speed of 160 m.p.h.

The Christmas Air Mail from Australia

AN aeroplane left Invercargill for Auckland, New Zealand, on November 12, collecting mail en route (over 3,000 letters made up the consignment), to connect with the air mail on the Australian National Airways' Avro 10, the *Flying Sun*, which is to leave Sydney for England on Saturday, November 21.

The England-Capetown Service

IT has been decided to open the through service from London to Capetown on January 20, 1932. The first northward service will leave Capetown on January 25, and is due at Croydon on February 5. The journey is to occupy 11 days. At present the African service of Imperial Airways ends at Mwanza, on the Lake Victoria. A full description of the African airway, with a map, was published in our issue of October 17, 1930.

Malta as an Air Centre

IN the House of Lords, on November 17, Lord Strickland called attention to the importance of Malta as a centre of air traffic, both from the point of view of commercial development and because of the position of the island as a most vital centre of British power overseas. With its great, but undeveloped, air ports of St. Paul's Bay on one side, and Marsaxoloe on the other, Malta must in the future constitute a principal stopping place on the main air routes to the East and South. Until a year ago Malta was considered too far from Great Britain for this purpose, but to-day it was an easy hop of 10½ hours' duration from Croydon. On the route to India it avoided the passage of the Alps. Lord Strickland urged that it should be made "the Clapham Junction of the air" as rapidly and as thoroughly as possible, as a wise contribution towards the maintenance of trade and as a defence of a great fortress and its dockyard.

The Marquess of Londonderry, Secretary of State for Air, replied that it was true that the flying boat was developing rapidly, and that its range was increasing, but to make use of Malta as a stage on the India or Africa services would involve a much longer route than was now flown. The use of Malta would entail a flight along the inhospitable shore of North Africa in conditions less favourable than those on the route now followed. The fact that Malta had been reached in one day in a light aeroplane did not mean that the route could be used for a regular commercial service. The Government had last year concluded agreements with Italy and Greece, after full consideration, and he saw no reason to suppose that the present services would not be continued for some time to come.

The piston ring is small but vital, and it is only by the finest workmanship on the finest material that satisfactory rings are produced to stand up to work in our aero engines

Piston Rings in the Making

THE majority of people, if they were asked how piston rings are made, would say that they are just rings with slots in them, and are probably cut off a machined-up cylinder by the hundred! Nothing is further from the fact. For the making of an efficient piston ring is a highly-skilled and intricate business which necessitates many different operations and, what is most important, a most elaborate inspection system which will ensure that only the perfect rings are put upon the market.

The main function of a piston ring is the maintenance of a seal against the gas pressure in the cylinder. That is, it must not allow the compressed gas to percolate down the cylinder walls past the piston. To fulfil such a function it must retain sufficient elasticity to exert a uniform pressure at all points of its circumference on the cylinder wall for the whole of its life, and, moreover, while doing so, it must withstand the abrasive effects which such a pressure induces.

This naturally calls for a very special material which provides elasticity, strength and resistance to abrasion without diminution over long periods. The common or garden cast iron is not elastic, and may take quite an appreciable set under load, but cast iron of a very fine grain, and hence with the graphite flakes in a very finely-divided condition, does come near this desirable elasticity.

This fineness of grain can best be obtained by the centrifugal casting process, and it is with this process that we are particularly concerned.

The British Piston Ring Co., whose trade name Brico is known the world over, have made a deep study of the production of high-grade centrifugally-cast iron for many purposes, and those who wish to know something about piston rings cannot do better than visit their factory at Holbrook Lane, Coventry.

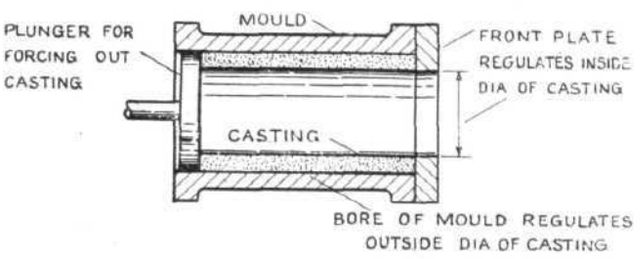
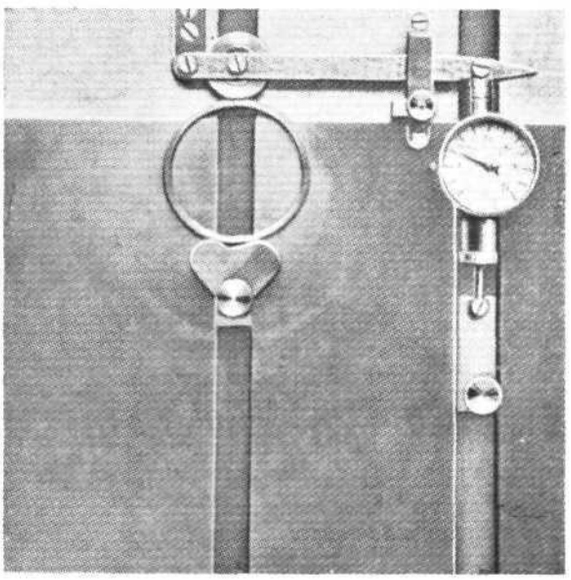
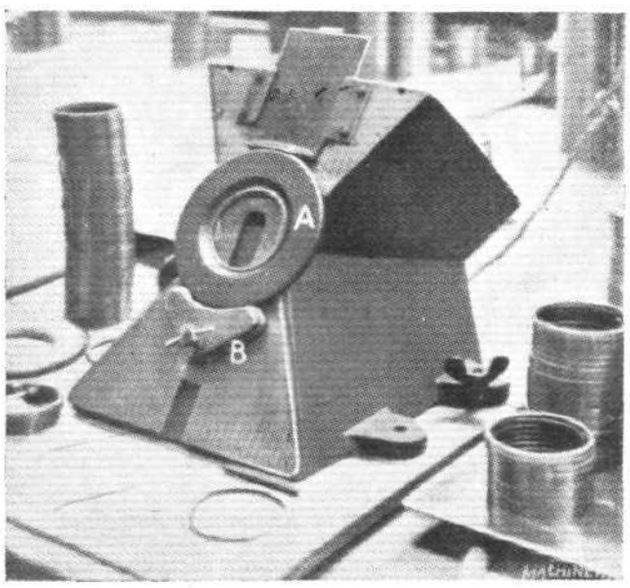


Diagram showing how the thickness of centrifugal castings can be varied.



Piston ring pressure gauge, a closing load being applied to an aero engine piston ring.

For the production of piston rings and cylinder liners (these latter being a product of theirs which is coming into general use now that heavy motor transport has assumed such proportions) hollow tubes or pots are cast in a metal mould while this latter is being rotated at high speed. Due to the centrifugal force, the molten metal is thrown to the outer surface of the mould, where it solidifies, and may almost immediately be withdrawn as a cylinder, the thickness of which is controlled by the amount of metal poured in and by the size of the hole in the front plate which closes the mould. These pots are placed on suitable lathes and turned down, both internally and externally, to the right size for the particular rings which are being made at the time.



Light Test for concentricity of piston rings. If the ring is not true then the light shows between the ring gauge (A) and the ring when this is rotated on the rollers (B).

The pressure which a ring exerts on the face of the piston wall is of great importance to its correct working. Too low a pressure means that the ring will take a long time to bed in and, moreover, may allow an undue amount of oil to pass to the combustion chamber, with a consequent loss of efficiency in the engine. Too tight a ring will raise the total friction considerably, and create an even greater loss of efficiency. At the Brico Works a test instrument is used which applies a load to the ring at the opposite ends of a diameter at right angles to the diameter through the joint; this load may be converted into lb./per sq. in. by the following formula:—

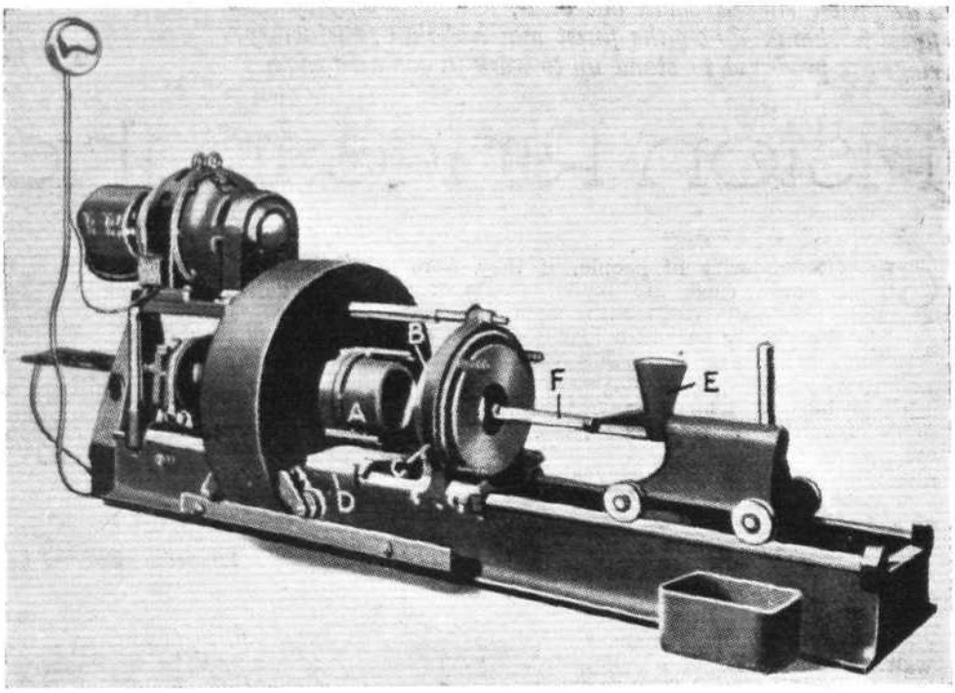
$$p = \frac{0.76\ Q}{db}$$

where p = pressure in lb./sq. in. on the cylinder wall,
Q = diametral load in lb.
d = bore of cylinder in inches.
b = width of ring in inches.

It is essential that the ring, when in the cylinder, should fit as a perfect circle, and thus be able to exert a uniform pressure around the whole of its circumference. A little thought will show that if the ring was made by taking a circular concentric ring blank of larger diameter than the cylinder bore, and cutting out of it the requisite gap, then the result, when closed in the cylinder, would be that the back of the ring only, for about 100 deg., would make

contact with the cylinder under uniform pressure. One method of overcoming this would be to make the ring of varying thickness, but obviously this is impracticable; therefore, another method is used, and that is to impart to the ring, in its free state, such a curve that it will close in a perfect circle. This curve is obtained by internal hammering, the intensity of hammering being greatest opposite the slot. The effect of this hammering, however, tends to weaken the ring, and although it has so far proved a practicable method, there is investigation being carried on to evolve a method whereby the ring may be formed to the correct shape in the first place. At present such a procedure is far too costly for it to be a commercial proposition, but it certainly has decided advantages and may become general practice before long.

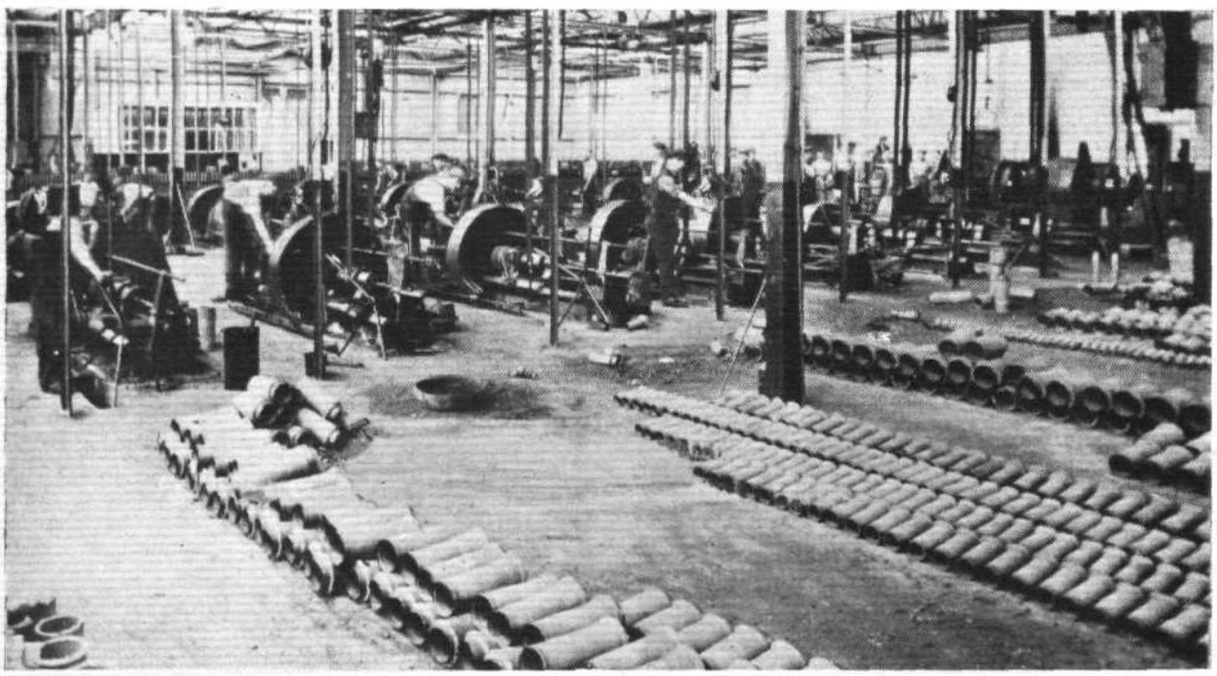
A visit to the Brico Works shows at once the care which is taken to ensure that the finished article is of the highest quality—it wouldn't be used in aircraft work if it wasn't! Inspection is made at every single stage of manufacture, the inspection department is exceedingly well organised, and there is a check department as safeguard, though it is said that this latter has never found anything to quibble about!



Centrifugal casting machine. A is the mould, B the cover plate which determines the thickness of the metal, C the ball-bearing support for B, D the headstock carrying mould spindle, E, funnel, and F, channel, along which the metal flows into the mould.

So great is the demand for Brico cast-iron parts (for the factory makes many other articles besides somewhere about 5,000,000 piston rings a year! as, for example, cylinder liners, valve guides, tappets, valve seatings, gudgeon pins, brake-drum liners, pistons, and in fact any part of a motor which may be subject to wear and, therefore, require replacement) that in recent years the whole factory has been greatly extended, and now a new foundry is about to be placed in commission on a new 14-acre plot.

The original factory started in 1909, when Mr. W. A. Oubridge founded the British Chuck & Tool Co. In 1911 so much progress had been made that it was decided to build a new works at Sandy Lane, the original ones being in Bishop Street, and here the foundry was erected alongside the machine shop. In 1914 a further advance was made with the factory at Holbrook Lane, which concentrated solely on piston rings. Now the new and latest factory is being built—all in 22 years! Surely a wonderful record for British piston rings.



A view of the centrifugal casting machine foundry of the British Piston Ring Co., Ltd., at Coventry.

Imperial Airways : Chairman's Speech

THE speech delivered by the Chairman, Sir Eric Geddes, of Imperial Airways, at the Seventh Ordinary General Meeting on October 15 last (to which reference has already been made in FLIGHT), has now been printed in a brochure issued by Imperial Airways, Ltd., from Airway Terminus, Victoria Station, S.W.1. This brochure, which is neatly produced with illustrations, is available to any of our readers who may be interested on application to Imperial Airways, Ltd.

SAFETY IN SPINNING

THE paper on "Safety in Spinning" jointly presented before the Royal Aeronautical Society by H. E. Irving, B.Sc., A.F.R.Ae.S., and A. V. Stephens, on November 5, was one of such unusual length (it would have occupied some 22 pages of FLIGHT) that we cannot, even if the subject could be supposed of sufficient general interest, attempt to publish it in full. Those of our readers who are really interested will have to await the full publication in the Society's Journal.

For obvious reasons a paper of this nature does not lend itself to being summarised, and the best we can hope to do is to place on record some of the statements made and conclusions reached by the authors of the paper.

In the introduction it is stated that the purpose of the paper is to give an account of the work on spinning and the progress made since Gates and Bryant presented their now historic paper to the Society, a paper which has since been published in a somewhat more comprehensive form as R. & M. No. 1001.

Irving and Stephens point out in their introduction that although it is distinctly possible that the aeroplane of the future will be "unspinnable," it is a fact that the great majority of present-day aeroplanes are capable of spinning either inadvertently or by deliberate intent on the part of the pilot. "If," they say, "it were really true that all those aeroplanes which apparently require to be forced into a spin would never inadvertently fall into one, a considerable number could be definitely classed as safe by forbidding spinning on such aircraft. As things are at present, however, no reliance can be placed on any assumption that an aeroplane which is usually unwilling to go into a spin will not under some unusual circumstance, such as, for example, flying in clouds, fall into one; and it sometimes happens that it is just those unwilling aeroplanes which give trouble once a spin has been allowed to develop."

One of the statements of the authors is that deductions as to the spinning properties of wings, based on autorotative or rolling properties without reference to sideslip, are practically meaningless.

From the point of view of the non-technical reader, the reference to the new vertical wind tunnel is, perhaps, not without interest. The authors of the paper refer briefly to free flight model experiments made by dropping balsa wood models in the balloon shed at Farnborough. This method has given some interesting results, but the time of the drop of such models is necessarily short, and the number of evolutions, say the number of complete spins, which a model can make in one drop, is limited. "When," the paper states, "the vertical tunnel is completed, it should be a fairly simple matter to test the spinning and recovery properties of any new aeroplane before it is flown, and it should soon become evident whether there is any scale effect of sufficient magnitude to cast doubt on its reliability as an indicator of the safety of an aeroplane in a spin. It may be pointed out that, as the weight and inertias of the model can be arranged so as to correspond to any altitude, we have here a means of putting on what is virtually a factor of safety by making the test correspond to a very high altitude."

Although the phenomenon of spinning arises from the inherent properties of the wings, difficulty of recovery from a spin results from a falling off in the efficiency of the tail organs. In the paper the authors deal at some length with tests on the effect of tail alterations. Some of these were occasioned by experiments on a typical twin-float seaplane, in which the presence of floats had considerable effect on the spinning properties, particularly by their effect on pitching moment. The effects were tried of such modifications as placing the tailplane on top of the fin and rudder; sweeping back the tailplane 45 deg.; moving the tailplane farther back on the fuselage; and removing the tailplane altogether. The results of these tests enabled the authors of the paper to place the various tail arrangements in some sort of order of merit according to the moments due to fin and rudder. In this order of merit three arrangements resulted in nearly equal moments, namely, tailplane on top of fin and rudder, tailplane swept back 45 deg. and the elevator down 90 deg., and tailplane removed altogether

With tailplane swept back 45 deg. and elevators down 45 deg., approximately $\frac{2}{3}$ of the possible improvement was obtained. Somewhat similar results were obtained with the swept-back tailplane and the elevator at 0 deg., and also with the "straight" tail moved back on the fuselage.

Free Flight Model Experiments

Concerning the free-flight model experiments in the balloon shed at Farnborough, the authors of the paper had some interesting things to say, and we quote the following passages.—

"During the last two or three years the technique of free flight model experiments has been undergoing continuous development at the R.A.E. In order to give some idea of the possibilities and limitations of these experiments, we shall describe the various methods which have been employed and indicate some of the difficulties encountered.

"The crux of the whole experiment lies in the use of true dynamical models, if the results are to be regarded as quantitative data; this implies that the moments of inertia and total weight of the model must bear certain simple relations with those of the full-scale aeroplane. The construction of accurate models combining adequate strength with sufficiently low weight has proved to be no easy matter and accordingly many of the tests have, of necessity, taken the form of comparisons between modified versions of the same model. The models are constructed of balsa wood and ballasted with lead. This wood has an extremely low density but is by no means homogeneous, and, in consequence, calculated values of the moments of inertia of a model are unreliable; some method of measuring them had therefore to be devised. For this purpose, the model is made to oscillate as a compound pendulum about knife edges parallel to the three axes and the relevant moments of inertia deduced from the observed times of swing. Owing to the relative lightness of an aeroplane with regard to its surface area a considerable virtual mass effect is present and it has been found necessary to perform the swinging tests in an atmosphere of low density; a chamber filled with hydrogen has proved satisfactory.

"The spinning experiments consist essentially in observing the model in free flight under gravity. Up to the time of writing these experiments have been conducted in still air in the balloon shed at Farnborough; the model was released near the roof of the shed and allowed to fall freely until arrested by a net near the floor 80 ft. below. This corresponded to a height drop of approximately 1,500 ft. for the models used. In these circumstances, it was not possible to represent the complete spinning manœuvre in one experiment unless the actual spin was of very short duration. Accordingly, the models were launched with a series of spinning motions at the top of the shed with the controls set either to maintain a spin or to produce a recovery, a rotary launching gear being employed. For some of the earlier experiments the models were launched in a stalled glide by means of ballistic pendulum and the preliminary stages of the manœuvre could be observed. In this way the available drop was used to the best advantage since it was possible to use the whole distance for a steady spin and also to observe the recovery from the motion and the incipient spin, in three separate experiments. The main observations were the number of turns which could be counted and the total time of the drop. The attitude of the model was determined from photographs and in some cases cinema records were taken and the motion of the model subjected to a detailed analysis.

"From dimensional considerations it can be seen that a $1/n$th scale model falling under gravity will move at a velocity which is $1/\sqrt{n}$ times that of the full-scale aeroplane. The tests are accordingly always carried out at a Reynolds' number which is $1/n\sqrt{n}$ times that at which the aeroplane operates, and there is no method of increasing it above this value, which is in practice about one-tenth that at which horizontal wind tunnel experiments are normally conducted. It is not easy to predict from existing data whether any serious scale effects are likely to be encountered in these circumstances. Experiments up to the present have been mainly of qualitative significance and it is unlikely that any appreciable errors will have arisen in the general conclusions which have been drawn. Before much faith can be put in the quantitative data obtainable at the low Reynolds' number a careful comparison between model results and full-scale experience will have to be made.

"*Experiments with Modified Tail Units.*—Experiments have been performed with 1/15th scale models of the original single-seater fighter and 1/20th scale models of the Bristol Fighter with a view to improving their spinning properties by redesigning the tail unit. The experiments with the fighter models were mainly directed at investigating the spinning characteristics of the original and deepened models to see whether the overall effects of the deepened fuselage and raised tail plane would bear out the encouraging conclusions drawn from the wind tunnel work. The scope of the experiments was somewhat limited, but all results indicated that slower and steeper spins and very much more rapid recoveries might be expected from the deepened fighter.

"When the original fighter model was launched in a fast flat spin with the controls set to maintain the motion it was found to complete fourteen turns of a spin at an incidence in the neighbourhood of 70°. On the other hand, if the model were launched in a slower motion or at lower incidence a totally different spin resulted, only six turns being completed in the same height at an incidence between 20° and 40°.

"Owing to the limited duration of these spins there was no direct evidence that either would not in time change into the other; on the other hand, there was no reason to assume that both types of spin were not conditions of equilibrium although the faster type might never be obtained with a natural method of entry.

"When the model was launched in the flat spin with rudder reversed it was observed to come out of the spin after five turns; on the other hand, a recovery from the steep type could be effected in half a turn with the same control setting. It is interesting to compare these results with full-scale experience. The original fighter completed three or four turns in a steep attitude before "flicking" into a flat spin.

"Reversal of the controls in the first stage produced an immediate recovery, whereas if delayed until the spin were fully developed, recovery was only effected with great difficulty.

"Experiments with the deepened fighter showed that the equilibrium of the flat spin could not be maintained; however the model was launched, a slow steep spin resulted. When the model was launched in a flat spin with the rudder set to oppose the motion, the direction of the spin was reversed after one turn. These results indicated a very appreciable improvement in design from the point of view of recovery from a prolonged spin, since the deepened model could recover with great rapidity from a spin both faster and flatter than it was ever likely to get into. The position of the centre of gravity corresponded to the condition of full military load for the full-scale machine.

"Further tests were carried out with two other modifications of the original machine; the tail plane was raised above the original fuselage to the same position as that of the deepened model, the fin area being unchanged in one case and increased to give the same profile as the deepened model for the other.

"In both cases the results were very similar to those with the deepened fighter. Spins at high incidence could not be obtained and recoveries were rapidly effected. The model with increased fin area was slightly superior to the other, but not quite as good as the deepened fighter both as regards rate of spin and rate of recovery.

"A similar experiment was carried out with a 1/20th scale model of the Bristol Fighter to compare the effectiveness of an increase in rudder area of 85 per cent. in combination with several fin arrangements, with that obtainable by raising the tailplane towards the top of the standard rudder."

The types of modified tail tested were:—(A) A higher fin and rudder than the standard; (B) a fin and rudder arrangement in which the rudder axis was sloped forward; (C) a rudder in which the maximum chord was placed low; (D) an inclined rudder, similar to (B), but on a deepened fuselage; (E) tailplane and elevator placed at top of rudder, but on ordinary fuselage; and (F) tailplane and elevator placed at top of rudder on a deepened fuselage.

"The additional rudder area," the paper continues, "was so disposed as to avoid to some extent the screening effects of the tailplane and elevators at high angles of incidence. Under test all units produced recoveries from a standard flat spin except the normal tail unit and the first of the modified ones. The order of merit as deduced from the number of turns required to do so was (F), (E), (D), (B), (C), (A). It was noticed that the rate of turn of the steady spin was lower than that obtained with the standard tail unit for each of the modified units." Comparison showed that the deepened fuselage was more effective than a wide one surmounted by a fin. It is concluded that the experiment as a whole demonstrated the futility of providing a large rudder situated immediately behind and above the tailplane as a means of ensuring recovery from spins at high incidence. A relatively small rudder can produce rapid recoveries from a flat spin if the tailplane is raised to the top of the fin.

Conclusions

Among the conclusions reached by the authors we quote the following:—

"The rudder is by far the most effective control for the purpose of recovery from an established spin.

"Ailerons are not likely to effect recovery by virtue of the rolling couple they can produce: their influence in stopping or augmenting the spin will be governed rather by the yawing moment which they exert (body axis).

"Powerful elevators will probably, in general, effect recovery from a spin; but the initial effect of setting elevators against the spin will always be to tend to set up another and faster spin.

"It is not clear that reversal of elevators invariably assists recovery during the flat spin stage, and some delay in moving the elevators down may conceivably help in certain circumstances.

"The following are beneficial both as tending to prevent the development of the flat spin and the falling off in rudder power while spinning:—Raising the tailplane. Sweeping back the tailplane or moving it aft of the fin and rudder. Positive dihedral angle on tailplane (bent upwards). Deepening the body.

"Seaplane floats generally tend in their effects towards making the spin flatter and slower. Their chief effect is on pitching moment, producing a large positive moment and reducing the elevator control in the spin. They also produce some positive yawing moment at flat spinning angles and seem to reduce rudder control.

"Differential ailerons, while probably of some use in recovery if the spin does not become flat, are apparently of little use in a really flat spin.

"Floating ailerons may be expected to effect but little improvement as regards recovery from a spin.

"Spinning calculations, based chiefly on rolling balance tests of a complete model rotated about the wind axis through the centre of gravity and a knowledge of the moments of inertia, appear to give a fair approximation to the spinning characteristics of the aeroplane and a rough indication as to its quality of recovery."

Before the discussion started, Mr. A. V. Stephens gave a very interesting demonstration with a small model of the vertical wind-tunnel which is now being built at Farnborough. This model, which was a many-sided vertical glass case of about 2 ft. diameter, had a fan at the top drawing the air upwards through it. Small balsa-wood models of various types of aircraft were used and placed on a vertical pivot on the floor of the tunnel, with the pivot arranged so that the models rotated approximately about the spinning axis. As soon as the fan was turned on and the air-stream reached sufficient force, these models rose up and spun most realistically. According to their loading and type, the attitude of spin varied, some being very flat and stable, some very steep and slow, while others only maintained the spin for a few revolutions before coming out to one side or the other.

Such a demonstration undoubtedly showed the path along which investigations in the full-sized tunnel could be led, and would appear to point to the fact that far more could be learnt from such experiments than from filming spinning models as they fall from the roof of a high building, such as the balloon shed previously used for this purpose.

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

OUR AIRSHIP POLICY

[2777] Our airship policy being a very polemical one, I wish to join the fray and enter my plea forthwith for the retention of R.100, and the construction of more rigid airships.

I have heard with much alarm that R.100 is for sale. One can only hope that it is but another rumour, as such a step would put us in the same position as those nations indifferent or apathetic to high-speed flight. All knowledge gained about airships will be lost, and the effort, later, to retrieve our position will be a costly one.

In my humble opinion an airship instruction school analogous to the High-Speed Flight should be maintained as a distinct and complete part of the R.A.F. It would not be a burden to the Exchequer, and in the near future would prove a better plan than the abandonment of our airship programme.

It is hard to believe that our financial position is so desperate that a small sum could not be set apart for further test flights with R.100. Later, passenger trips would make her self-supporting.

With such shining examples of airships before us as the *Graf Zeppelin* and the *Los Angeles*, which have successfully completed innumerable flights, the former in Arctic and Tropic temperatures, it is difficult to comprehend our stand.

The new *Akron* has passed her tests and recently carried the record number of 207 passengers on a ten-hour cruise.

Germany and the United States are both building bigger airships and will have a fleet of lighter-than-air craft in a few years.

We must realise the fact, and it must be most forcibly brought home to the powers concerned, that the work must go on. Airships are absolutely indispensable to us and our Empire.

JOSEPH RALPH.

New York, U.S.A.,
November 6, 1931.

POBJOY ENGINE PARTS

[2778] Having read with interest your article on page 1125 of this week's issue, headed "Butler's Flight to Australia," we would like to make the following comment on a portion of same, to which amendment we shall be glad if you will kindly give due prominence in your JOURNAL at an early date.

We refer to the 11th paragraph, wherein you state: ". . . a large number of the parts for this engine, including the cylinder barrels, heads and pistons, etc., are manufactured by the Mollart Engineering Co., of Queen's Road, Thames Ditton," whereas the cylinders from the actual castings, with the exception of the final honing and fitting of heads, were dealt *throughout* at these works.

Other items we also machined from the raw material for the same engine comprised:—Complete crankcases, pumps, oil filter and tank, valve caps, big-end and other bushes, magneto brackets, breathers, starter gland assemblies, tappet guides, etc.

A.B.C. MOTORS, LTD.,
T. A. DENNIS.

Walton-on-Thames,
Surrey.
November 13, 1931.

AIRISMS FROM THE FOUR WINDS

Mr. Mollison Fails

MR. J. A. MOLLISON, who established the record for a flight from Australia to England last August, has been unfortunate in his attempt on the England-Cape record, now held by Miss Salaman and Mr. Store. After waiting some time at Lympne to start for Africa on his D.H. "Gipsy Moth," he set out on November 6, only to return shortly after on account of very foggy conditions. It was not until November 13 (*and* a Friday!) that he eventually got away once more, but after making excellent progress during the next two days he came to grief and had, *pro tem.*, to abandon the attempt. After leaving Lympne at 3 a.m. on November 13 he made a non-stop flight to Rome, where he refuelled and proceeded to Brindisi. Continuing the following morning he flew to Athens, leaving shortly after for Cairo. He did not arrive here according to schedule, however, and at first some anxiety was felt until news came in that he had crashed in the dark at Minieh, 150 miles from Cairo. His machine was badly damaged, but he was unhurt.

R.A.F. West African Flight

THE four Fairey III F (Napier Lion engines) of No. 45 (Bomber) Squadron, under the command of Sqd. Ldr. F. J. Vincent, D.F.C., which had been sent out from Helwan on a trip to Nigeria, Gold Coast, Sierra Leone and Gambia did not succeed in pushing further west than Niamey, in Nigeria. While the flight was at Sokoto, a stage west of Kano (the capital of Nigeria), information was received from the French authorities that yellow fever had broken out and that it would be impossible for the flight to adhere to its original programme. An alternative route was considered, but sufficient petrol supplies were not available along it. It was, therefore, decided to return. The flight, accordingly, arrived back at Khartum on November 15. We propose to deal with this flight in greater detail next week.

Fatal Crash in South Africa

ON Friday, November 13, a "Puss Moth" belonging to the Union Airways crashed while flying over the Sir Lowry Pass en route to Capetown. The machine was piloted by Capt. Davenport, who was accompanied by two passengers, Mr. Duteil and Mr. Young, and it is understood that a quantity of mails were also carried. The district in which the crash occurred is known for its violent air currents and gusts, and the conditions in the Pass are, apparently, very similar to those met with at the place where, some time ago, Commander Glen Kidston and Mr. Gladstone lost their lives. Until further information is available it is impossible to state whether or not the machine was overloaded, but the fact that it carried three people as well as mails rather points that way. On the other hand, the amount of fuel carried at the time may have been such that there was no overloading of the machine. The question naturally arises whether certain areas and districts should not be entirely avoided under certain weather conditions, or at any rate whether it should not be compulsory for aircraft to cross them at some minimum height. Investigations made in the United States seem to indicate that weather conditions *can* be met with such that no aircraft could live in them. The "Puss Moth" has been thoroughly tested, both statically and in flight, and its strength factors are now considerably above requirements. But it may be that even with the high factors and with no overloading, an aircraft can encounter vertical air currents of such magnitude and with boundaries so sharply defined that the suddenness of entering them is sufficient to break any machine, however strong. The subject is one of vast importance, and investigations should be instituted at once. The matter is one of far more than local interest, and might well be thought worthy of international research. It seems an obvious case for meteorologists to attack before aeronautical experts can determine whether or not structural engineering is able to cope with the situation.

Aerial Ambulances for Russia

Two aeroplanes, each equipped with two hospital beds and with medicines, are to be constantly on duty at a new flying ground being built at the Botkin Hospital, Moscow.

The Spartan Mail Carrier

MR. H. E. BROADSMITH, of Spartan Aircraft, Ltd., writes in connection with the photograph published on p. 1130 of FLIGHT for November 13, pointing out that in the caption the machine is erroneously described as the "Saro-Percival," and that it should have been termed the "Spartan Mail Carrier." Mr. Broadsmith adds that Spartan Aircraft, Ltd., of East Cowes, Isle of Wight, is carrying out the development of this type for both passengers and mails.

Some New Hendy Machines

MR. BASIL B. HENDERSON writes to tell us that he has resigned his position as Manager and Company Secretary of Southern Aircraft, Ltd., and that he has now no connection whatever with that company. Mr. Henderson is at work on two new types of aircraft, both of which will have cruising speeds in excess of 130 m.p.h. Nothing more may be said of the machines at present, but it is expected that they will be flying by May of next year. Readers who wish to communicate with Mr. Henderson are reminded that letters addressed to him at the Hendy Aircraft Company, Shoreham Aerodrome, Sussex, will find him.

Soviet Airships

ACCORDING to the Riga Correspondent of the *Morning Post*, an appeal was issued to local branches from the headquarters of the Communist League of Youth and from the Ossoaviakhim (the Society for the Promotion of Aerial and Chemical Armament) asking them to organise collections on November 7, the anniversary of the Bolshevist revolution, in aid of a squadron of airships to be called after Lenin. Sixteen million roubles were collected for this purpose last year, and still larger sums are asked for now in order to continue the construction of the eight airships.

Approved Inspectors' Dinner

THE Director of Aeronautical Inspection and some of his headquarters staff, together with the staff of the A.I.D. Northern Office at Sheffield, are meeting the Chief Inspectors of local firms approved by the A.I.D. at a dinner to be held at the Royal Victoria Station Hotel, Sheffield, on Friday, December 4. It will, perhaps, be recollected that at the A.I.D. Technical Staff Association Dinner, held in London last May, Col. Outram referred to a suggestion that an annual dinner might be held in Sheffield, at which the inspectors of firms in the neighbourhood could meet the A.I.D. staff with whom they worked. Col. Outram then welcomed the suggestion, and the dinner to be held on December 4 is the outcome of this suggestion, and will be the first, it is hoped, of a number of annual dinners of this nature. The local works engaged on aircraft will be fully represented, and there is no doubt that the good relationship between the local inspection staffs and the A.I.D. will be furthered and consolidated by such a gathering.

No. 70 Squadron Re-Union Dinner

A RE-UNION dinner of No. 70 Squadron has been arranged for Friday, November 27, at the R.A.F. Club. For particulars apply to Capt. C. D. Griffiths, R.A.F. Club, on or before November 24.

Schneider Contest, 1931, Banquet

To commemorate the British victory in the Schneider Contest, 1931, and also the securing of the World Speed Records, the Royal Aero Club will hold a banquet at Claridge's Hotel on Wednesday, December 9. Presentations will be made to the members of the Schneider Team, and Certificates of performance in connection with the World Speed Records will be presented to Supermarine Aviation Works (Vickers), Ltd., Rolls Royce, Ltd., and to the pilots—Flt. Lt. G. H. Stainforth, A.F.C., and Flt. Lt. J. N. Boothman, A.F.C. The price of tickets (exclusive of wines, etc.) is £1 1s. Members may be accompanied by ladies. Early application for tickets should be made to the Royal Aero Club, 119, Piccadilly, London, W.1.

Capt. Barnard's Eastern Cruise

WE understand that Capt. C. D. Barnard proposes to set out next month on a winter cruise to Egypt and Palestine in his "Fokker" monoplane *The Spider*. A number of passengers will be taken on this cruise which will include Italy, and while in Palestine and Egypt, Luxor, The Pyramids, and the Valley of the Kings will be visited.

Aerial Mapping of Nile Valley

THE mapping of 11,000 sq. miles of the Upper Nile Valley has just been completed by two Fairey machines of the Air Survey Co. at a saving of £60,000 and years of work on the ordinary methods.

AIRPORT NEWS

MANCHESTER'S BEACON LIGHT

AT five o'clock in the evening of Guy Fawkes' Day, November 5, Sir William Davy, Chairman of the Manchester Airport Committee, switched on the lights of the huge beacon which is built on the roof of Messrs. Rylands' premises in Market Street, Manchester.

This beacon is unique in that it is the first of its kind in the country. It gives out a light of 20,000 candle-power, and under ordinary weather conditions will be visible for 60 miles. The illumination is provided by 25 "Neon" tubes, each 12 ft. long, and 36 tubes arranged in a circular formation.

The steel tower which carries the beacon is about 165 ft. above pavement level and 315 ft. above sea level. The "lighthouse" will be switched on automatically from sunset to sunrise, and by making night flying safer and easier will be a great help in developing civil aviation.

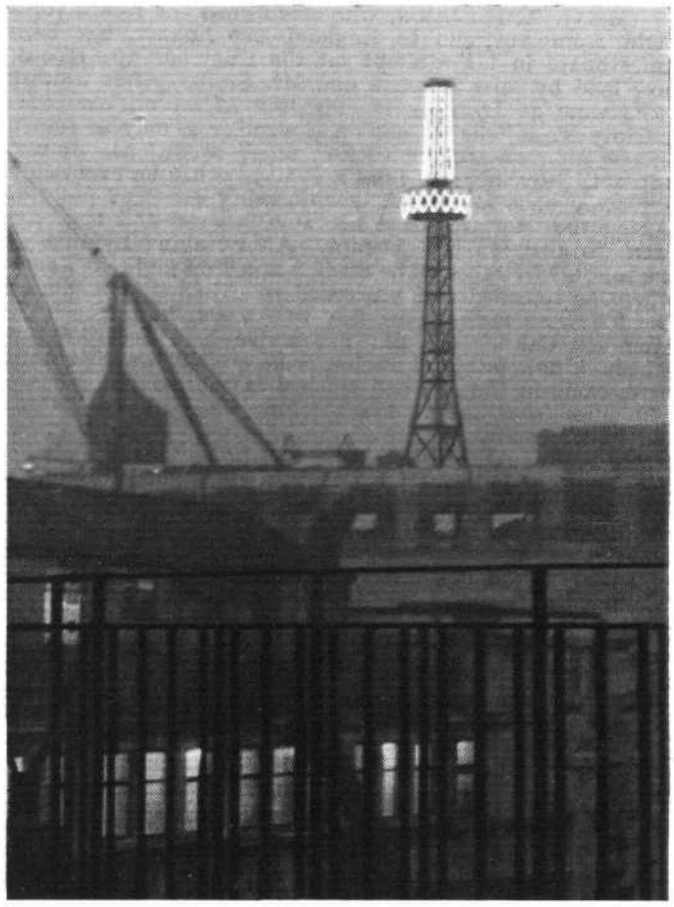
Provision is made for a searchlight to be fitted which will throw a powerful ray in the direction of Manchester's Airport at Barton Moss. The beacon will be charted by the Air Ministry as the official guide to this airport.

A number of well-known airmen were present at the opening ceremony, and a dinner in celebration of the inauguration was held afterwards in the Queen's Hotel.

Alderman Davy, speaking at the dinner, said he had no fear but that Manchester Corporation would eventually be vindicated for spending £50,000 on its aerodrome.

"We are losing about £2,000 a year on this venture at present," he added, "but that is comparatively nothing to a city like Manchester, when you know what the results will be in some years' time. Six million pounds were sunk in the Ship Canal, and it has made Manchester."

"Mariners of the air," said Sir William, "will be grateful to Messrs. Rylands for their public-spirited enterprise in erecting the first aviation signpost in Britain."



MANCHESTER'S NEW BEACON: A 20,000 candle-power aerial beacon which has been erected on the roof of Messrs. Ryland's premises in Market St., Manchester.

CROYDON

THE first of the Handley Page 42's, Eastern type, named *Horsa*, left at 10 a.m. last Monday morning to join its station at Cairo. It was piloted by Capt. Alcock, brother of the famous Atlantic flyer, and he was accompanied by Maj. Brackley, Air Superintendent, Western Division of Imperial Airways. A crowd which gathered to give it a send off included Maj. Woods Humphrey and other high officials of the Company. Maj. Richard, the officer in charge of the airport, was present, and Air Ministry officials from various departments. A record flight was not anticipated, and at the time of writing, the machine was flying somewhere between Malta and Tripoli.

On Tuesday Mr. Edgar Percival arrived on the 3-engined Spartan Mail Carrier single-seater monoplane, which has been constructed as a fast mail carrier. Everyone who remembers the original single-engine "Hendy" could not fail to see the designing was the same, as it has "Hendy" lines. It looks a nice job and should answer the purpose for which it has been built.

On the same day Lady Louis Mountbatten travelled to Paris on the 12.30 p.m. Imperial Airways Service.

The "Focke Wulf" has paid us a visit and everybody found it interesting, as it is entirely out of the ordinary.

The new civil air ensign has now been permanently installed in front of the main buildings, and, fluttering in the breeze, seems to add a sense of importance to the airport. It has struck me as strange that the various air line concerns have not adopted their own house flag, as the shipping companies. Every shipping company has its own house flag, which are helpful in identifying the various lines.

British Air Transport have now replaced their first Klemm with another of the same type.

An Avro X belonging to the Indian Government arrived on Saturday and will proceed to India in the course of a few days. The fuselage is painted black.

A few high official personages of the Air Ministry came down the other day and it was rumoured they were setting forth to find another emergency landing ground in the vicinity of Redhill.

November fogs have descended upon us, but all services were run to schedule. This is the time of the year when the officers in the control tower find their work much harder. Flying in a fog, the pilots mainly depend on the control tower, and wireless plays an important part in the safe arrival of these services to and from the Continent.

The traffic figures for the week were:—Passengers 601; freight 44 tons.

P. B.

Doncaster Municipal Aerodrome

ON November 9 Doncaster Corporation decided to proceed with the first part of their scheme for a municipal aerodrome at a cost of £12,500. The total scheme will cost £320,000.

Air Signs

FURTHER progress is being made in the scheme for the construction of Standard Air Signs throughout Great Britain. Leeds, Bolton and Swindon are to have ground signs according to the A.A. specification which was recommended for adoption by the Civil Aviation Section of the London Chamber of Commerce. It is also understood that the authorities at Bury have the matter under consideration. In addition, the Leamington Priors Gas Company have had a sign painted on a gasholder, whilst similar action is contemplated by the Council at Wellingborough, Northants.

THE ROYAL AIR FORCE

London Gazette, November 10, 1931.

General Duties Branch

The ollg. are granted permanent commns. as Pilot Officers with effect from October 24, and with seny. of dates stated :—P/O. W. E. Coope (R.A.F.O.) (April 24, 1930) ; F/O. H. R. A. Edwards (R.A.F.O.) (October 24, 1930) ; J. M. Freeman (October 24, 1930) ; P/O. A. L. Holland (R.A.F.O.) (October 24, 1930). (Substituted for *Gazette*, November 3). P/O. on probation K. R. Warton is confirmed in rank (October 28).

The follg. Pilot Officers are promoted to rank of Flying Officer :—H. Ford, W. R. Sadler (March 27) ; M. H. Kelly (August 21) ; W. Halmshaw (September 14) ; R. G. E. Catt, J. G. B. O'Hagan (October 11) ; R. N. Clarke, C. J. Farrell (October 13). P/O. R. C. Parker is promoted to rank of F/O. (April 14). (Substituted for *Gazette*, July 21.)

The follg. are promoted with effect from November 1 :—Flight Lieutenants to be Squadron Leaders.—C. J. S. Dearlove, A. L. Paxton, D.F.C., R. H. Hanmer, M.C., S. L. Quine, M.C., W. E. Theak. Flying Officers to be Flight Lieutenants.—J. S. Phillips, G. P. Macdonald, T. C. Dickens, J. Norwood, P. MacG. Watt, P. de C. Festing Smith, D. W. R. Ryley, E. C. Lewis.

Wing Com. J. C. Russell, D.S.O., relinquishes the acting rank of Group Captain on ceasing to command Station H.Q., Amman (October 19) ; Sqd.-Ldr. R. Halley, D.F.C., A.F.C., is placed on half-pay list, scale A, from August 20 to September 16, inclusive ; Sqd.-Ldr. P. F. Fullard, D.S.O., M.C., A.F.C., is placed on half-pay list, scale A, from September 6 to October 4, inclusive ; F/O. D. A. L. Campbell is transferred to Reserve, Class C (October 28) ; Flt-Lt. S. H. Reynolds is placed on retired list on account of ill-health (November 11).

Stores Branch

The follg. are promoted with effect from November 1 :—

Flight Lieutenant to be Squadron Leader.—W. G. MacD. Nicholl.

Flying Officers to be Flight Lieutenants.—P. H. Burt, G. Scarrott, J. Davison, R. G. A. Vallance, F. H. Bedford, M.C., M.M., W. T. Lewis.

Flt.-Lt. C. A. Longhurst is placed on retired list (November 11).

Medical Branch

V. H. Tompkins, M.R.C.S., L.R.C.P., is granted a short service commn. as Flying Officer for three years on the active list with effect from and with seny. of November 1 and is seconded for duty at the General Infirmary, Leeds. The follg. Flight Lieutenants are promoted to rank of Squadron Leader (November 7) :—E. C. K. H. Foreman, M.R.C.S., L.R.C.P. ; W. J. G. Walker, M.R.C.S., L.R.C.P.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F/O. on probation E. W. Percival is confirmed in rank (October 20) ; F/O. C. K. Turner Hughes is transferred from Class A to Class C (November 8). The follg. are transferred from Class AA (ii) to Class C :—F/O. W. W. L. Jones (November 7) ; P/O. B. E. A. Pollard-Urquhart (July 31).

Flt.-Lt. A. Haines is transferred from Class C to Class A (October 25) ; F/O. B. B. F. Russell is transferred from Class C to Class AA_1(ii) (November 2).

Medical Branch

F/O. W. A. Beck is transferred from Class D (ii) to Class D (i) (November 19 1930).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commanders : L. T. N. Gould, M.C., to H.Q., Coastal Area, for Signals Duties, 21.10.31. K. C. Buss, O.B.E., to Central Flying School, Wittering, whilst undergoing flying refresher course, 26.10.31. R. S. Maxwell, M.C., D.F.C., A.F.C., to No. 23 Group H.Q., Grantham, for Air Staff duties, 22.10.31.

Squadron Leaders : C. B. Cooke, to Aircraft Depot, Hinaidi, Iraq, 24.10.31. W. W. Hart, M.B.E., and P. Huskinson, M.C., to H.Q., Iraq Command, Hinaidi, 24.10.31. A. W. Fletcher, O.B.E., D.F.C., A.F.C., to No. 203 Sqdn., Rangoon, 24.10.31. J. M. Mason, D.S.C., D.F.C., to No. 7 Sqdn., Worthy Down, 28.10.31. W. K. Mercer, to No. 5 Sqdn., Quetta, India, 5.10.31. V. Buxton, O.B.E., to Station Flight, Andover, 26.10.31. C. Findlay, D.F.C., to R.A.F. Depot, Uxbridge, 5.10.31.

Flight Lieutenants : J. F. A. Day, A.F.C., to Station H.Q., Andover, 1.10.31. C. G. Wigglesworth, A.F.C., to No. 10 Group H.Q., Lee-on-Solent, 22.10.31. J. Warburton, to R.A.F. Depot, Uxbridge, 8.10.31. E. H. Richardson, to H.Q., Aden Command, 16.10.31. A. E. Beilby, to No. 8 Sqdn., Aden, 16.10.31. G. R. O'Sullivan, to No. 39 Sqdn., Risalpur, India, 16.10.31. G. C. Stemp, to No. 60 Sqdn., Kohat, India, 16.10.31. D. F. W. Atcherley, to No. 28 Sqdn., Ambala, India, 16.10.31. R. L. Edward, to No. 5 Sqdn., Quetta, India, 16.10.31. R. A. Whyte, to No. 3 (Indian) Wing, Quetta, 16.10.31. N. C. Pleasance, to Aircraft Park, Lahore, India, 16.10.31. W. L. Payne, to No. 58 Sqdn., Worthy Down, 27.10.31. C. E. Williamson-Jones, D.F.C., J. M. Glaisher, D.F.C., P. J. R. King and G. B. M. Rhind, to Aircraft Depot, Hinaidi, Iraq, 24.10.31. C. Guppy, to No. 1 Armoured Car Coy., Hinaidi, Iraq, 24.10.31. D. N. Roberts, to R.A.F. Depot, Uxbridge, 5.10.31. E. Burton, to No. 6 Sqdn., Ismailia, Egypt, 24.10.31. F. M. Denny, to No. 57 Sqdn., Netheravon, 20.10.31. P. J. Bett, to H.Q., Inland Area, Stanmore, 29.10.31.

Flying Officers : J. R. Watson, to No. 20 Sqdn., Peshawar, India, 16.10.31. T. H. Downes, to No. 39 Sqdn., Risalpur, India, 16.10.31. C. W. W. S. Conway and J. R. Palmer, to No. 31 Sqdn., Quetta, India, 16.10.31. W. T. Ratcliffe, to No. 28 Sqdn., Ambala, India, 16.10.31. E. A. Cooke, to No. 101 Sqdn., Andover, 22.10.31. A. E. Smith, to No. 40 Sqdn., Upper Heyford, 22.10.31. J. H. Manning-Fox, to No. 20 Sqdn., Peshawar, India, 30.9.31. E. J. Laine, to R.A.F. Base, Calshot, 28.10.31. J. R. Stebbing, to No. 24 Sqdn., Northolt, 26.10.31. G. F. Alexander, to Station H.Q., Northolt, 26.10.31. L. R. Mouatt, to No. 56 Sqdn., North Weald, 27.10.31. J. R. Robins, to Home Aircraft Depot, Henlow, 1.11.31. T. Gadd, to No. 55 Sqdn., Hinaidi, Iraq, 24.10.31. E. L. Brackenbury, to No. 1 Armoured Car Company, Hinaidi, Iraq, 24.10.31. D. A. Messiter, to No. 30 Sqdn., Mosul, Iraq, 24.10.31. V. B. J. Jackson, to Central Flying School, Wittering, 19.10.31. R. V. Redpath and G. J. C. Paul, to R.A.F. Depot, Uxbridge, 1.10.31. S. L. Blunt, to No. 18 Sqdn., Upper Heyford, 20.10.31. H. G. Adams, to No. 26 Sqdn., Catterick, 28.10.31. L. E. Chiswell, to No. 16 Sqdn., Old Sarum, 21.10.31.

Pilot Officers : T. N. Coslett, to No. 5 Sqdn., Quetta, India, 16.10.31. W. T. H. Nichols, to No. 20 Sqdn., Peshawar, India, 16.10.31. C. M. Windsor, to No. 28 Sqdn., Ambala, India, 16.10.31. M. B. Edwards, to No. 8 Sqdn., Aden, 16.10.31. E. R. S. Johnston, to No. 99 Sqdn., Upper Heyford, 11.10.31. F. W. Yates, to No. 10 Sqdn., Boscombe Down, 11.10.31. D. H. Marsack and A. H. Marsack, to No. 45 Sqdn., Helwan, Egypt, 10.10.31. J. R. Wemyss, to No. 8 Sqdn., Aden, 14.10.31. P. Bathurst, L. G. Brooks, M. F. Calder, T. C. Chambers, J. H. A. Chapman, G. W. Heather, A. D. Isemonger, A. Moncrieff, all to No. 4 Flying Training School, Abu Sueir, Egypt, 24.10.31. A. C. Drew, to No. 35 Sqdn., Bircham Newton, 14.10.31. J. R. Paget, to No. 207 Sqdn., Bircham Newton, 14.10.31. H. Bottomley, D. W. Baird, W. J. H. Ekins, K. F. Ferguson, V. G. Govett, R. W. Hay, W. A. W. Jameson, M. W. Kimpton, P. R. J. Leborgne, W. C. Le Page, C. E. S. Lockett, J. K. Quill, Q. W. A. Ross, J. C. Sisson, D. M. Somerville, J. J. A. Sutton, F. W. L. Wild, all to No. 3 Flying Training School, Grantham, 24.10.31.

Stores Branch

Wing Commanders : H. L. Crichton, M.B.E., to H.Q., Aden Command, 16.10.31., for Stores Staff duties. C. L. Archbold, to Air Ministry (D. of E.), for Stores Staff Duties, 16.10.31.

Flight-Lieutenants : A. Walters, to H.Q., Aden Command, 16.10.31 O. G. Ridley, M.C., to Air Ministry (D. of E.), 16.10.31. S. R. L. Poole, to Air Ministry (D. of E.), 23.10.31. C. E. Tidy, to Aircraft Depot, Hinaidi, Iraq, 24.10.31. L. Smith, to No. 3 Stores Depot, Milton, 26.10.31.

Flying Officers : H. M. S. Dawes, to Stores and Supply Depot, Aden, 16.10.31. W. H. Dyson and R. J. Williams, to Aircraft Depot, Karachi, India, 16.10.31. P. H. Burt, to Supply and Transport Services, Iraq, 24.10.31 C. W. Goodchild, M.B.E., to Aircraft Depot, Hinaidi, Iraq, 24.10.31. M. W Keey, to H.Q., Wessex Bombing Area, Andover, 27.10.31. R. M. Taylor M.C., to H.Q., Fighting Area, Uxbridge, 30.10.31.

Accountant Branch

Flight-Lieutenants : C. G. Prior, to H.Q., Aden Command, 16.10.31 J. Freeman-Fowler, to No. 6 Sqdn., Ismailia, Egypt, 7.10.31. S. C. Wyatt, to No. 45 Sqdn., Helwan, Egypt, 7.10.31.

Flying Officer : H. D. Connor, to No. 8 Sqdn., Aden, 16.10.31.

Medical Branch

Wing Commander : F. N. B. Smartt, to H.Q., Coastal Area, for duty as Deputy Principal Med. Officer, 23.10.31.

Squadron Leaders : E. A. Lumley, M.C., to H.Q., Aden Command, 16.10.31. R. A. G. Elliott and G. H. P. Maxwell, go H.Q., Iraq Command, Hinaidi, 24.10.31.

Flight-Lieutenant V. S. Ewing, to Palestine General Hospital, Sarafand, 24.10.31.

Flying Officer C. H. Smith, to Med. Training Depot, Halton, on appointment to a short-service commn., 2.10.31.

Dental Branch

Flight-Lieutenant B. L. Harrington, to H.Q., Iraq Command, Hinaidi, 24.10.31.

Flying Officer J. G. Stewart, to No. 5 Flying Training School, Sealand, 2.11.31.

Chaplains Branch

Revd. C. A. Smith and T. M. Jones, to H.Q., Iraq Command, Hinaidi, 24.10.31.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty :—

ROYAL AIR FORCE

Flying Officer E. M. F. Grundy, to R.A.F. Depot (Sept. 26).

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AIR MINISTRY NOTICE TO GROUND ENGINEERS

No. 62 of the year 1931. Validity of Ground Engineers' Licences in Categories "A," "C," and "D." (141169/31)

Ground engineers' licences in category "A" will in future be worded to make it quite clear whether or not they are valid for duties in connection with the installation and maintenance of compasses (including compensation thereof), turn indicators, and electrical equipment ; that is to say, licences in this category will be endorsed so as specifically to include or exclude such duties. Existing "A" licences in which these duties are not specifically excluded will, on renewal, be endorsed without examination of the holders to include them.

Ground engineers' licences in categories "C" and "D" will in future be worded to make it quite clear whether or not they are valid for duties in connection with supercharged engines ; that is to say, licences in these categories will be endorsed so as specifically to include or exclude these duties. Holders of existing "C" or "D" licences which do not specifically include duties in connection with supercharged engines, will normally be required to undergo an examination before their licences can be endorsed to include such duties. Where no examination has been taken, the licence will on renewal be endorsed to exclude these duties.

November 5, 1931

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THE ROYAL AIR FORCE MEMORIAL FUND

THE usual meeting of the Grants Sub-committee of the Fund was held at Iddesleigh House, on October 29 Mr. W. S. Field was in the Chair, and the other members of the committee present were :—Mrs. L. M. K. Pratt Barlow, Mrs. F. Vesey Holt. The Committee considered in all sixteen cases, and made grants to the amount of £468 14*s*.

At the meeting held on November 12, Mr. W. S. Field was in the Chair, and the other members of the committee present were :—Mrs. L. M. K. Pratt Barlow, O.B.E. ; Air Commodore B. C. H. Drew, C.M.G. ; Mrs. F. Vesey Holt. The committee considered in all eleven cases, and made grants to the amount of £204 19*s*.

THE INDUSTRY

Stormgard Weatherwear

AN interesting development and addition to the trade of Leeds has been made by A. Whyman, Ltd., the manufacturers of the well-known Stormgard Weatherwear. A contract for a special type of clothing has recently been placed by the Air Ministry with this firm, and it is the first time that this special class of work has ever been placed in Leeds. Further inquiries concerning this firm's special productions are not only being received from all parts of the world, but several foreign Governments have made inquiries for further details.

Luxor Goggles for Holland

E. B. MEYROWITZ, LTD., of 199, Regent Street, W.1, manufacturers of the world famous Luxor Goggles, have just received a large contract from the Military Department of the Dutch Government of Amsterdam, and they are using the new No. 10 model exclusively. This is the second large order Meyrowitz have had for this model from the same source, and they are looking forward to other contracts from the various Governments throughout Europe.

Rotax Electrical Equipment

AN interesting catalogue has recently been issued and can be procured for the asking, of a special lightweight electrical equipment for light aeroplanes by Rotax, Ltd., Willesden Junction, N.W.10. The sales department is under the close supervision and guidance of Mr. E. Pearce, who will be pleased to hear from any FLIGHT reader interested in this subject.

" Petro-Flex "

HOBDELL, WAY & CO., LTD., of 20, St. Clare Street, E.1, the manufacturers of the well-known " Petro-Flex " tubing, have just issued a leaflet illustrating some of the famous users of " Petro-Flex " tubing, and also giving instructions—in English, German and Spanish—for fitting this tubing. Copies of this leaflet can be supplied to any member of the trade who is interested.

Vacuum Mobiloil

IN last week's issue, through a slip of the pen, the lubricating oil used in Mr. Butler's record flight to Australia was given as Mobile Oil ; it should be understood the correct title of this oil is Vacuum Mobiloil.

The " Graphic " African Airways Number

PUBLISHED on November 14, the *Graphic* African Airways number forms an exceptionally interesting encyclopedia of Africa and African conditions, particularly as they apply to aircraft operation. This number contains a wealth of valuable information, is, of course, plentifully illustrated in the usual *Graphic* style, and has many well written articles of African interest. A coloured centre spread painted by W. E. Johns shows Alexandria with two Short " Kent " flying boats of Imperial Airways arriving there, and might well have been called a study in " Mediterranean Blue." A cheerful and encouraging note is lent by the fact that the same issue contains illustrations and a report of the opening of the present Parliament, on whose constructive handling of the tariff question depends the immediate future of aviation to such a large extent.

Miss Lippens's " Professor " Sailplane

AN unique opportunity has arisen to buy a " Professor " sailplane complete with trailer of the most up-to-date pattern. It was on this machine that Miss Lippens made the world's duration record for women. Miss Lippens would like to sell her machine in view of the difficulties of taking it back to Belgium. She is over here for a brief holiday, and is anxious to dispose of the machine at a reasonable price, but should she fail to sell it she will take it back with her. The machine is being looked after with the Channel Club's machines close to Folkestone, and arrangements can be made to see it. Miss Lippens realises that in the present depressed state of affairs people have little money to spend, so she is willing to accept a very reduced price for her machine and trailer, which cost over £225. The price asked is £150, but any reasonable offer will be considered. Three or four pilots might well club together to buy this machine which has such an outstanding record to its credit. Inquiries should be addressed to Miss Lippens, care of The British Gliding Association, 44a, Dover Street, W.1.

Accessories

BROWN BROS., of Great Eastern Street, London, E.C.2, are taking an increasing interest in aircraft accessories, and their monthly journal (which will be sent to those in the aircraft trade who write mentioning FLIGHT) now has an article devoted to aircraft instruments by A. Hessell Tiltman which is of great interest.

PUBLICATIONS RECEIVED

Jahrbuch 1931 *der Seutschen Versuchsanstalt für Luftfahrt, E.V.* Edited by Dr.-Ing. W. Hoff. R. Oldenbourg, Munich. Price M. 62.

Aeronautical Research Committee Report for the Year 1930-31. London: H.M. Stationery Office, W.C.2. Price 2s. net.

The Straight Road. " The Autocar," Dorset House, Tudor Street, London, E.C.4.

An Introduction to Aeronautical Engineering: Vol. II, Structures. By J. D. Haddon. Aldershot and London: Gale & Polden, Ltd. Price 6s. net.

Comparative Air Armaments of the World. August, 1931. Compiled by Carl Byor and Associates, 10, East Fortieth Street, New York.

IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

For 1910 and 1911 figures see FLIGHT for January 25, 1912.
For 1912 and 1913, see FLIGHT for January 17, 1914.
For 1914, see FLIGHT for January 15, 1915, and so on yearly, the figures for 1930 being given in FLIGHT, January 16, 1931.

	Imports.		Exports.		Re-exports.	
	1930.	1931.	1930.	1931.	1930.	1931.
	£	£	£	£	£	£
Jan.	...2,987	7,965	147,935	142,596	—	1,074
Feb.	...2,460	3,303	226,049	110,587	1,000	1,293
Mar.	... 744	5,615	156,098	83,088	802	3,441
April	...2,959	2,216	213,390	213,401	79	530
May	11,706	1,964	158,460	275,382	2,550	198
June	15,029	6,780	252,443	78,298	1,060	361
July	14,216	1,790	170,594	177,006	938	131
Aug.	5,382	3,556	146,564	153,834	6,912	2,316
Sept.	2,757	1,088	109,363	218,987	1,730	1,074
Oct.	..3,502	1,863	140,235	124,810	355	4,505
	61,742	30,140	1,721,121	1,577,980	15,426	14,923

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion ; m. = motors. (The numbers in brackets are those under which the Specification will be printed and abridged, etc.).

APPLIED FOR IN 1930

Published November 19, 1931

20,227. M. E. BOURGEOIS. Fabric for parachute suspensions. (359,580.)
21,944. BAYERISCHE FLUGZEUGWERKE and W. MESSERSCHMIDT. Aircraft. (359,436.)
23,302. D. NAPIER AND SON and E. E. CHATTERTON. Fuel-injection pumps. (359,603.)
28,874. D. NAPIER AND SON and E. E. CHATTERTON. Liquid-fuel injection pumps for i.c. engines. (359,384.)
33,599. I. MAKHONINE. Aircraft with variable supporting surfaces (359,747.)

APPLIED FOR IN 1931

Published November 19, 1931

9,600. FIAT SOC. ANON. Gears for actuating the auxiliary devices of radial aircraft engines. (359,866.)

SECRET PATENT RE-ASSIGNED TO THE INVENTOR

APPLIED FOR IN 1928

Published November 19, 1931

9,077. R. PURVES and C. J. STEWART. Apparatus for discharging fluid from aircraft. (359,574.)

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